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VOLUME XXV DECEMBER, 1921 Number 6

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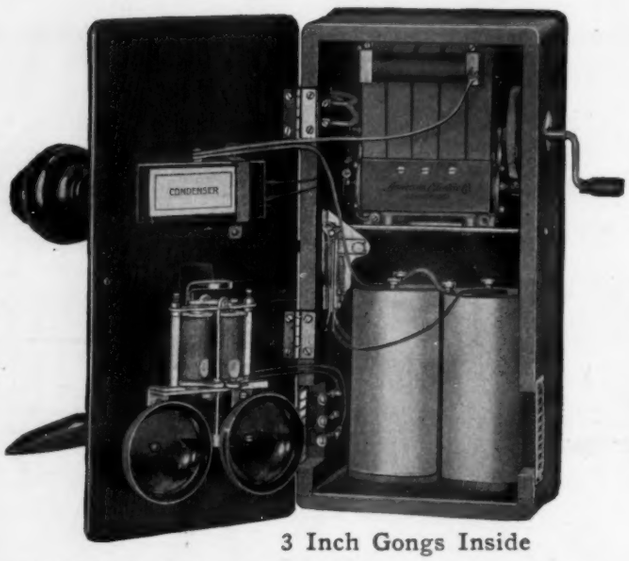

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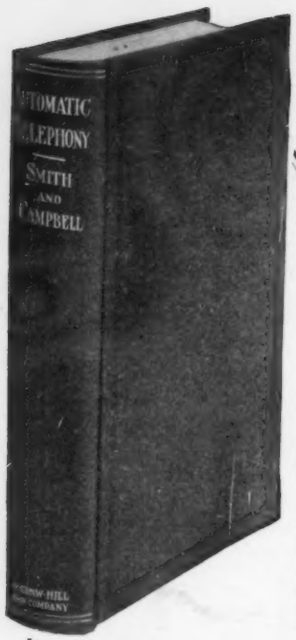

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VOL. XXV DECEMBER, 1921 NUMBER 6

Getting Phantom Circuits

Purdue University's Telephone Authority Presents Practical Hints on Theory and Practice in Phantom Circuit Work to Illinois Convention's Delegates

By R. V. Achatz

The possibility of carrying on more than one telephone conversation over a single circuit without interference between the messages has a peculiar appeal to the imagination. This idea and the kindred one of using the circuit simultaneously for telephone and telegraph messages is almost as old as the telephone itself. Professor Shepardson in his book on "Telephone Apparatus" states that the name phantom circuit was applied to a system of simultaneous telegraphy and telephony in 1883 by George Black, a writer in the Electrical World. An English patent for simultaneous telegraphy and telephony was granted to F. Jacobs in 1882. The English inventor proposed to use resistances arranged in a Wheatstone's bridge form to prevent interference between the two signals. An early American method planned the use of repeating coils in the same way as they are used in what is known as the simplex circuit.

The application of the phantom idea to commercial circuits was delayed for many years after its invention because an efficient type of repeating coil had not been developed. It was not until the first years of the present century that a satisfactory phantom coil was developed and even then the cost of the coil was so high that its use was not extensive except by the larger companies. Since the development of the modern high efficiency coil at more reasonable prices, the application of the phantom circuit has increased rapidly. It is the practice of the long distance companies to use the phantom wherever physical circuits of the proper type are available and local companies are using them more and more on comparatively short toll circuits and in cases where it is desired to obtain a larger number of circuits for a given number of wires used for rural service.

Principle of Phantom Circuit.

Telephone men are generally well informed as to the principle of the phantom circuit and what is said here in the way of a brief description of its operation is for the purpose of making more clear some of the things that will be said latter rather than for the purpose of explaining the manner in which it functions. The name phantom implies something ghostly and mysterious and difficult of comprehension. It suggests a circuit between two terminals without any real physical path for the flow of current. As a matter of fact the current in a phantom circuit has a path over conductors of real physical material just as truly as the current in an ordinary circuit composed of two wires has a path over conductors of real physical material. This may be illustrated by the chart of the simplex circuit Figure One. . As far as the metallic telephone circuit on this chart is concerned its operation differs in no way from that of any metallic circuit into which two repeating coils have been introduced. It is true that the introduction of the repeating coils makes a slight reduction in the transmission efficiency of the circuit but with modern, well-designed coils this reduction is scarcely appreciable even to a skilled observer.

If the path of the current in the grounded circuit is traced it will be found that it flows through two coils of the winding and then out over the two wires of the line in the same direction. From the two wires it flows through two coils of the repeating soil at the distant end to their juncture and then back to earth. Since the current in the metallic circuit flows out over one wire and bck over the other and the current in the grounded circuit flows out over both wires and back

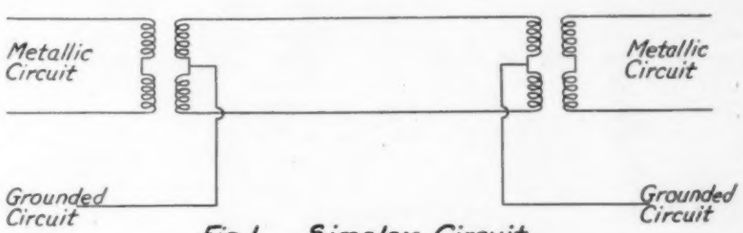


Fig. 1 Simplex Circuit

through the earth, the current in one wire is made up of the current of the metallic circuit and that of the grounded circuit flowing in the same direction while that in the other wire is made up of the current of the metallic circuit and that of the grounded circuit flowing in opposite directions. In other words, in one conductor the two currents are added and in the other conductor the resulting current is their difference.

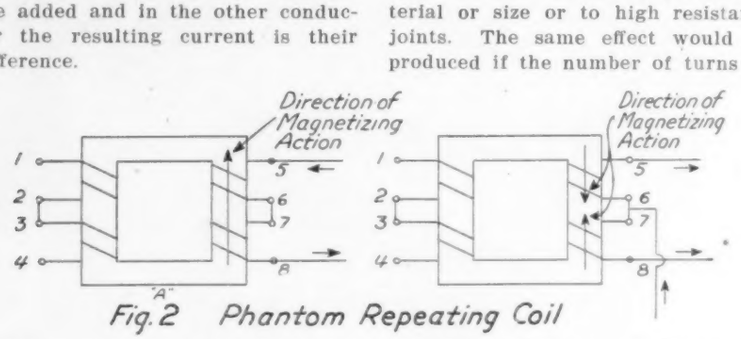


Fig. 2 Phantom Repeating Coil

The repeating coils at the terminals of the line provide the filtering action which prevents the current of one circuit from reaching the terminal apparatus of the other. This filtering action is illustrated by the chart of the repeating coil Figure two. Figure two-A at the left shows the condition when a current flows from one of the line wires into the coil at terminal No. 5 and out into the other wire from terminal No. 8. Since the current flows in the same direction through the coils 5–6 and 7–8 they will both tend to magnetize the core in the same direction. If changes occur in the strength of the magnetic field as the voice current varies a voltage will be induced in the coils 1–2 and 3–4 which are connected to the metallic line.

In Figure two-B a current is flowing into the coil at the juncture of terminals 6–7. At this point it divides and flows through the two coils 5–6 and 7–8 and out over the two line wires in parallel. Since the current flows through the two coils in opposite directions, the magnetizing effects of the two coils will be opposite as shown by the arrows. If these two effects can be made exactly equal there will be no magnetic field set up in the core and consequently any change in the current flowing into the coil at the terminals 6 and 7 and out over the two wires in parallel will have no effect in creating a voltage in coils 1–2 and 3–4. Therefore, a telephone user whose set is connected to the terminals 1 and 4 would receive no disturbance from the current flowing over the grounded circuit.

If for any reason the magnetizing effect of one coil is greater than the other a disturbing current will be set up in the coils 1–2 and 3–4 and interefernce between the metallic circuit and the grounded circuit will result. This may occur when the current in the two coils is not exactly equal as may be the case where one of the wires is slightly grounded or where one of the wires has a higher resistance than the other due to different conductor material or size or to high resistance joints. The same effect would be produced if the number of turns on the coils were not exactly equal which may occur if lightning punctures the insulation and short circuits some of the turns of one coil.

Simplex circuits are used extensively in practice for superposing a telegraph circuit on a telephone circuit. They are also used for dialing directly to subscribers of automatic exchanges from distant points over toll lines and for grounded telephone circuits where service conditions permit the use of grounded telephone lines.

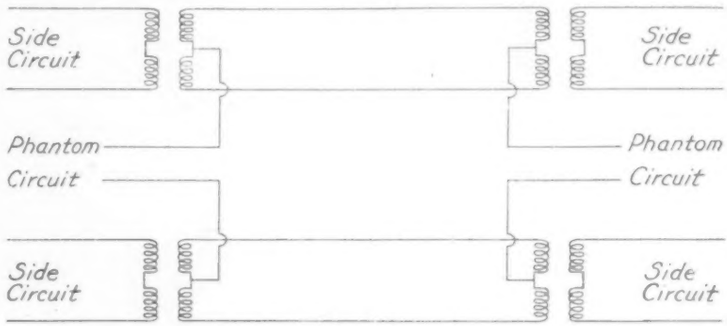


Fig. 3 Phantom Circuits

The phantom circuit shown in the next chart Figure 3 is a metallic circuit obtained by using a simplex circuit on another physical circuit as a return path instead of using the ground as in the previous circuit. In this case, the four wires of the physical circuit or side circuits as they are commonly called must have the same resistance or interference will result between the phantom and the side circuits. If lines could be maintained in an ideal condition it would be possible to superpose a third phantom on two phantom circuits thus making seven circuits out of eight wires but the difficulty of operation increases as the number of superposed circuits increases. It is not commercial practice to superpose more than one phantom on a group of physical circuits although a simplex telegraph circuit may sometimes be worked over a well balanced phantom.

Phantom Circuit Repeating Coils.

The preceding discussion suggests some of the requisites of a satisfactory phantom repeating coil. Among the more important are:

1. Perfect balance.
2. High talking efficiency.
3. High ringing efficiency.
4. High insulation.
5. Low resistance.

It was once thought that high talking and high ringing efficiency were incompatible and a long period elapsed before a coil suitable in both respects for phantom work was produced. The earlier coils were large, heavy and expensive and were not of the highest talking efficiency. In later years, the manufacturers have been able to secure a more satisfactory kind of steel for the core, and have improved methods of manufacture and testing so that the phantom coil of today is scarcely larger and more expensive than talk-through coils and have a loss in transmission of less than one half-mile of standard 19-gauge cable.

The balance of a repeating coil includes not only perfect balance in resistance between the windings but also balance of inductance and capacity as unbalance in any of these factors will result in cross talk. In some coils the wires of the two coils forming one half of the coil are wound in parallel while in other coils all four wires are wound on the core together in order to have exactly the same length and number of turns.

Transpositions in Phantom Circuits.

An untransposed phantom circuit is subject to cross talk just as an untransposed physical circuit. This cross talk may occur between the

phantom and other circuits or between the phantom and its own side circuits. For this reason the transposition layout used on the lead on which phantom circuits are installed must provide transpositions on the phantom circuits as well as on the physical circuits. There are four types of phantom circuit transposition which are illustrated on the chart Figure 4. In type 1 both side circuits and the phantom circuit are transposed. In types two and three one or the other of the side circuits and the phantom is transposed. In type four the phantom only is transposed. These types are necessary as the cross talk transpositions in the side circuits must be maintained and

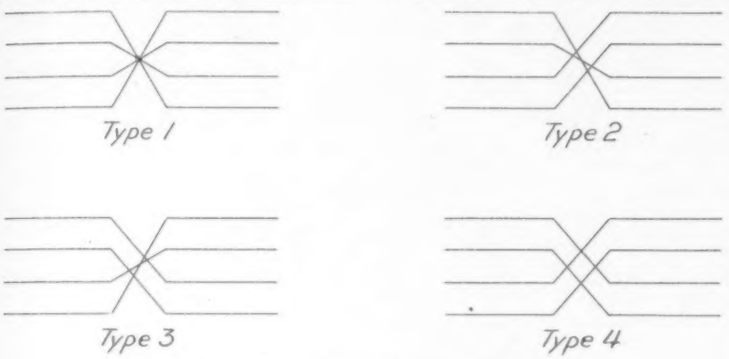


Fig. 4 Phantom Transpositions

they sometimes come on the same pole as the phantom transposition.

The modern form of the phantom transposition employs a four point bracket which does away with the use of special transposition insulators and maintains practically equal spacing between the wires. When transpositions are to be cut into existing circuits it is sometimes necessary to keep the circuits working and special care must be taken to prevent interruption of the operation. In some cases special switching sets are used both in the office and out on the line. When the lineman is ready to make the cut the keys are thrown and the wires are cut but service is maintained through the key set until the wires can be spliced again.

Phantom Circuits in Cable.

Phantom circuits can not be worked successfully through great lengths of ordinary lead covered cables. This is due to the variation of the length and capacity of various conductors in the cable. For toll cables where many phantom circuits are employed a special type of cable known as "quadded cable" has been developed. This type of cable is used extensively for toll entrance cable and for toll cables between important centers. The cable is made up in "quads", that is in groups of four wires instead of pairs. Two wires are twisted into a pair and two pairs are twisted together to form the quad. In this way the length and capacity of each wire of the quad is kept the same and as the two pairs forming the quad are twisted together, both the side circuits and the phantom are transposed every few feet with respect to each other and to all the other circuits in the cable.

Phantoms on Loaded Circuits.

When phantoms are to be applied to loaded circuits, the loading coils on the physical circuits do not act as loading on the phantom and it is necessary to use an additional loading coil to load the phantom. The type of coil used to load the side circuit must be so arranged that the flow of current in the same direction through the two wires of the pair does not interefere with the operation of the coil as a loading of the side circuit.

There is a tendency at the present time to revert to non-loaded circuits particularly on open wire lines and to install telephone repeaters at shorter intervals.

Cost of Installing Phantom Circuits.

One of the factors that must be considered when the installation of phantom circuits is planned is the cost of the circuit as compared to the cost of a physical circuit to furnish the same facilities. There are two elements entering into the cost of phantom circuits, (1) the cost of the phantom coils, mounting and protection and the installation of the coils and (2) the cost of phantom transpositions. It is not often the case that an entire new phantom group is strung, at least as far as the smaller companies are concerned and the rearranging of existing circuits before the phantom transposition can be cut in may increase the cost. However, it would not be fair to charge to the cost of the phantom the expense of trimming trees and other work of clearing up present circuits as this is properly a maintenance charge on the present plant.

The cost of installing the four coils in two central offices where the necessary lightning arresters are already available might run from $30.00 to $40.00. If the coils are to be mounted on poles the cost of housing, lightning arester and ground would increase this figure. The cost of phantom transpositions per mile of phantom circuit will vary over considerable limits depending upon the spacing of the transpositions, the distance from the office, the necessity of keeping the circuits working, etc. It might be as low as $5.00 per mile on some jobs and twice that on others. In any case however, it can be said that the cost of phantom transpositions per mile of phantom circuit would be less than the cost of stringing physical circuit. This would indicate that phantom circuits should be employed wherever the side circuits are available and the saving would amount to about the cost of wire for physical circuits less the cost of the coils and installation.

The lower cost of phantom circuits compared to physical circuits has lead to the use of phantoms on toll circuits wherever the required number of physical circuits are available. Long distance plants are so designed that a circuit which is not to be phantomed at once is placed in a pin position such that when another circuit is added the two will form a phantom group by cutting in the phantom transpositions. The circuits on pins 1 and 2 and 3 and 4 usually form one phantom group and those on pins 7 and 8 and on 9 and 10 from another group. Circuits on pins 5 and 6 are usually formed into vertical groups with those on 15 and 16.

Transmission Efficiency.

The statement is often made that phantom circuits talk much better than physical circuits. It is rather difficult, however, to find any definite statement as to just how much more efficient the phantom is. In the first place, the introduction of the phantom coils makes a slight reduction in the efficiency of the side circuits. This reduction, allowing .4 miles of standard cable per coil or .8 for the two coils, is equivalent to increasing the length of a No. 12 NBS Ga.

(.104") copper circuit or a No. 10 B&S Ga. (.102" diam.) by about 10 miles. This would reduce the maximum length of this type of circuit permissable between toll centers by about five percent. On No. 12BWG iron wire circuits the effect of adding phantom coils is the same as that of increasing the length between two and three miles.

The transmission on a phantom circuit is better than on a physical circuit due principally to the fact that the resistance of the two wires in parallel is half the resistance of the single wire of the physical circuit. This does not mean, however, that the phantom may be used for twice the distance that one of its side circuits may be used. Transmission efficiency depends upon the capacity, inductance and leakage of the wires as well as the resistance and in all of the commercial types of circuits the capacity is the predominating factor in causing a loss in transmission. The capacity of a phantom circuit is higher than that of a side circuit and so the increase in capacity prevents the realization of the full benefit of the decrease in resistance. The actual proportion fo No. 12 NBS (.104" diam.) copper circuit is that 85 miles of physical circuit is equivalent to 100 miles of phantom considering only the circuit itself without terminal losses. This means that the loss in the phantom is 15% less than in the non-phantomed physical circuit.

To illustrate this in another way, a table has been prepared comparing the transmission equivalents of a non-phantom physical circuit, a side circuit and a phantom circuit of No. 10 B&S copper wire. The circuits are assumed to be 50 miles long and to be treminated with a very small amount of cable at each end. The loss assumed at each end due to cable, heat coils and switchboard wiring is assumed to be .5 miles of standard cable. Under the conditions the transmission equivalents are respectively 4.95, 5.65 and 4.65 miles of standard cable. This shows that the phantom is about 6% better than the non-phantomed circuit and the side circuit is about 15% poorer. If the length of the circuit were increased in length to 200 miles with the same terminal conditions the phantom would be about 13% better and the side circuit about 3½% poorer than the non-phantomed circuit.

	Non-Phantomed Circuit	Side Circuit	Phantom Circuit
Terminal Loss, mi. std cable	1.0	1.0	1.0
Line Loss 50 mi. circuit mi. std. cable	3.95	3.95	3.35
Repeating Coil loss mi. std cable....	....	.8	.3
Total loss	4.95	5.65	4.65

Table I. Comparison of 50 miles Circuits.

Practical Application of Phantom Circuits.

In applying phantom circuits to existing plant, it is well to keep in mind some of the more important points that may affect the successful operation of the phantom. The side circuits should be of the same gauge and kind of wire and should not differ too greatly in condition. This latter applies particularly to iron wire circuits as it would be inadvisable to phantom two circuits, one of which is new wire and one old and corroded as it would be practically impossible to balance the circuit. The same thing would apply to circuits having different gauges of wire and it would be out of the question to attempt to phantom an iron and a copper circuit. The circuits should be located in the proper pin positions to permit of the installation of the phantom transpositions and should not be carried through any great lengths of subscribers cable. In fact, it is to be recommended that the circuits be carried to the office pole wherever possible and the entrance made by means of No. 14 B. & S. copper twisted pair. This applies particularly to smaller offices and cases where regular toll entrance cable is not installed.

The wires should then be gone over and all trees trimmed and other possible grounds removed. A preliminary test should be made of the insulation and the resistance of the wires. The insulation test is the ordinary one made with the wire chief's voltmeter on each wire separately with the distant end free. The resistance test may be made with a bridge making a loop test with the distant end of the circuit short circuited and grounded in which case the resistance on each side of the loop to ground should be the same. This test may also be made with the shunted voltmeter with the distant end short circuited and grounded, in which case the voltmeter reading should be approximately the same from each wire to ground. If the reading is not the same it is probably due to a high resistance joint which may be located by repeating the test at different points on the circuit until the trouble is located.

After the wires are cleared up, the transposition scheme should be laid out and the transpositions cut in. The manufacturers of phantom coils will supply transposition layouts or the information may be obtained from some of the telephone text books or specification handbooks. Care should be taken that the transposition poles are spaced evenly at the standard distance, 1300 feet, and it may be necessary to check the distances on old pole lines. After the circuits have been transposed the insulation should be again measured and the resistance checked to make sure that each wire has exactly the same resistance.

If the phantom coils are to be located in central offices, the ordinary protection will be sufficient to protect the coils. If they are to be located outside on poles, suitable protection from the weather should be provided and an efficient form of lightning arrester with a good ground should be installed. There are many satisfactory forms of arrester on the market for this purpose. The central office wiring, whether connected through a test panel or not, should be arranged so that the phantom coil can be cleared from the line and testing instruments connected directly to the wires in case of trouble.

Ringing trouble frequently occurs where intermediate stations are cut across a side circuit and as far as possible the circuits should be arranged so that no stations are cut across the lines between the phantom coils. This of course is not always possible where farm lines are phantomed. Ringing trouble may also occur on grounded phantoms if a grounded ringing generator is used or in cases where an ungrounded generator is used if it happens that grounded lines are being rung at the same time.

Phantom circuits may be used in many different combinations with physical circuits. A phantom circuit may be extended by means of a phys-

ical circuit or a long physical circuit may be looped through an intermediate point and phantom coils cut in to form a phantom with a shorter circuit. A long physical circuit may have more than one phantom superposed on it at different portions of its length. It must be remembered that each set of coils introduced a transmission loss in the circuit and too complicated arrangement may not be satisfactory. The writer recalls one circuit about 90 miles long that was made up of sections consisting successively of a side circuit, a phantom, a non-phantomed physical circuit, a side circuit and a phantom, the circuit being carried parallel to itself in one place for several miles. Needless to say, the arrangement could scarcely be expected to form an efficient circuit.

Maintenance of Phantom Circuits.

Circuits which are phantomed are subject to a greater amount of trouble than non-phantomed circuits. A case of trouble on one wire will affect not only the side circuit but the phantom as well and in certain cases trouble will throw out of service the entire group. Test panels are usually arranged so that the coils may be cut out to restore service on at least one side circuit in case of trouble.

Inductive interference is usually more severe on phantoms than on side circuits. In one study covering several hundred circuits distributed over a large area, it was found that 60% of the phantoms showed more than a certain amount of noise when tested with a noise testing set while only 35% of the physical circuits showed the same amount.

On account of the greater susceptibility of phantomed circuits to trouble higher standards of maintenance must be established than for lines consisting exclusively of non-phantomed circuits and therefore the cost of maintenance per wire mile is increased. Taking into account the greater number of circuits and the improved service, however, the use of the phantom is well justified and should be extended wherever the physical circuits are available and the facilities needed.

Telephone Language Up-To-Date

(1)

If you find you want a typist, a stenographer or clerk
From a hundred other applicants—SELECTOR.
When you find her at your elbow and you're going to "try her out"
And you get a closer look at her—INSPECTOR.
If she brags about her competence and quotes certificates
At a hundred miles an hour, then you must—TESTER.
If she understands your lingo and her taking's pretty slick,
Then the best thing you can do is to—INSTALLER,
And CONNECTOR to your Office with a BELL.

(2)

Every time you *think* you want her (and other times as well)
All the energy required is just to—RINGER.
If she doesn't come immediately, don't lose your bally head.
There's no need to get upon your desk and—HOWLER.
She may only be "slow-acting" and "sluggish to the core,"
Or maybe with some Male Jack she is—BUSY.
She's sure to turn up sometime, when she does remember this.
You're a gentleman, so don't—TRANSMITTER CHEEK.
Though you know she knows you know what she's been doing.

(3)

If her movements they are languid and she's always looking bored,
Then for Heaven's sake do something to—EXCITER.
If she's too much of a hustler and rampages like a bull,
Then you've got your work cut out to—REGULATOR.
If she slinks into your office half an hour behind her time,
Be a sport—don't let her think that you—DETECTOR.
But if she gives you impudence and tries to show her airs,
Just assert yourself and—WIPER BACK TO EARTH,
And let her see you mean to SUPERVISOR.

(4)

If some bounder in the office wants to take her for a walk
And she doesn't like his movements, then—PROTECTOR.
If she runs off with your cheque book and forges up your name,
And your bank sends in an overdraft—ARRESTER.
If someone dashes in your office with work no one else will do,
Jerk your thumb towards her door and—INDICATOR.
She may curse you but she'll do it, for she loves the man who rules,
And she's got no time for one who can't—CONTROLLER.
And every time she tries to talk just—INTERRUPTER.

G. E. C. in Electricity of London.

Grand Opera Now Transmitted By Radio Telephone.

Grand opera by radio telephone, over an area of 750,000 square miles, was initiated by the Westinghouse Electric and Manufacturing Co. in establishing its fourth Radio broadcasting station on the Edison Building, Chicago. This feature arranged by George Foster, of the Commonwealth Edison Co., that city, with Mary Garden, General Director of the Chicago Opera Co., allows thousands of persons throughout the central part of the country to enjoy the benefits of opera. Small transmitters at the Auditorium theater pick up the singing of the artists and the music of the orchestra. These transmitters are connected through a telephone line to the Radio station, KYW, where the sound waves are sent broadcast, on a 360 meter wave length, without relaying. The first regular opera to be broadcasted was "Samson and Delilah", its wonderful solos and striking storm effects being reproduced perfectly. It is planned to broadcast opera every night during the ten weeks season of the Chicago Opera Co. News service also will be given similar to the Westinghouse Stations, WBZ, at Springfield, Mass., WJZ at Newark, N. J., and KDKA at East Pittsburgh, Pa. With the Chicago station operating but a few days, letters already have been received from operators in Texas, North Carolina, Vermont, Canada, Minnesota, and many other remote places, reporting that they hear the opera distinctly. The schedule of Chicago station, KYW, at present is from 7:30 P. M. until 11:00 P. M., central time, operating on a 360 meter wave length.

Concord's Courtesy Returned by Manufacturer.

Concord, N. H.—As a follow-up of the pleasant relations formed during a "Telephone Week" visit of the local telephone plant, the William B. Durgin company, of this city, was host of the staff of the telephone company on an inspection tour of the Durgin plant.

Snappy Work by Phone to Catch Check Crooks.

Pittsburgh, Pa.—Within a half an hour all members of the Retail Credit Men's association will be notified of the operations of any phoney check passers, or other crooks, by means of the telephone protetcive plan just inaugurated.

Independents in Big Meet

Their 25th Convention, or Silver Jubilee, Proves to be One of the Greatest in the History of the Telephone Industry

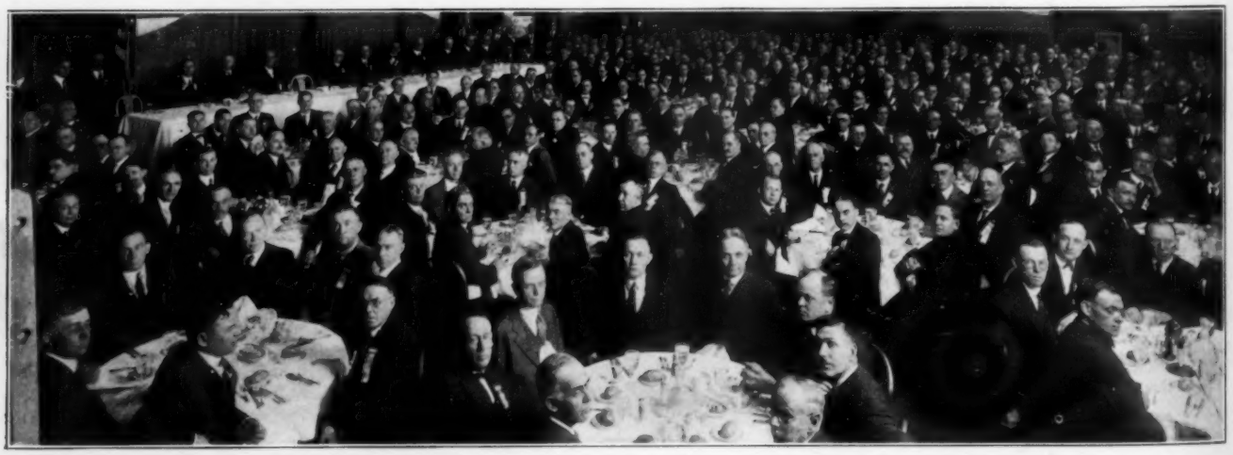
Taking as a standard of measurement the great convention they held at Chicago, Nov. 15–18, one must judge the Independent telephone men of America to be not only prosperous and aggressive, but supercharged with an enthusiasm that augurs well for the future. In point of attendance, this 25th annual meeting was a record breaker. Its exhibits were complete and indicative of the industry's progress. The arrangements were admirably handled by men of mature judgment and experience, led by Sec. Deering. The programme included helpful addresses and discussions on the topics of the day, many of which were outlined in a masterly manner in Pres. MacKinnon's address. Practically 1,000 of the livest wires in the business were there to revel in the treat this great business gathering afforded. Its social features were by no means the least important in interest and all of them were crowned with a luncheon and entertainment by the Pioneers that taxed the capacity of Hotel Sherman's largest banquet hall and side rooms, thrown together.

OFFICERS RE-ELECTED BY U. S. INDEPENDENT TELEPHONE ASSN.

President	F. B. MacKinnon
Secretary	C. C. Deering
Vice-Presidents	F. L. Beam J. B. Earle W. S. Vivian

Address of Pres. F. B. MacKinnon.

Pres. F. B. MacKinnon, later re-elected with Sec. C. C. Deering, by virtue of their excellent work, dwelt in his opening address on the advantages the Independents may attain through adopting the latest apparatus, accessories and methods for which their field is noted. He predicted that great advances will take place in state, federal and international telephone problems as the world grows normal again. He referred to the development in wireless and pointed to the recent significant progress in radio which will have important bearing upon telephony. Regulation by commissions, uniform accounting, relations with employees and other timely topics were reviewed. In evidence of the growth of the U. S. Independent Telephone Association, Mr. MacKinnon cited the fact that it has now 34 Class A company members, as compared with 27 last year and 136 Class B members as against 118 a year ago. Within the year 20 state conventions were attended by Mr. MacKinnon. During the year, Congress passed a law enabling the Interstate Commerce Commission to authorize consolidations between Independent and Bell Companies wherever such consolidation can be shown to benefit all concerned and at the same time not disturb the competitive equilibrium. Income tax developments are transmitted promptly to all company members from the association's headquarters at Washington and advice is given as to the proper course to pursue. One of the strong points made by Mr. MacKinnon was to the effect that present proceedures in rate making should be altered by commissions so as to compensate for brains, industry and ambition, as well as for the mere capital invested. He declared the public wanted a change quite as much as telephone men because people are insisting on good service, calling for adequate facilities and competent management. With extension of high tension lines throughout the rural districts, which is coming fast, comes also the enlarged problem of inductive interference for telephone men to solve, and this will require earnest cooperation between the two factors involved. In conclusion, Pres. MacKinnon referred to the part the telephone men of America played in the war, and voiced a eulogy in memory



Luncheon and Entertainment of the Independent Telephone Pioneer Ass'n at Hotel Sherman, Chicago, Thursday, Nov. 17, During the 25th, or "Silver Jubilee", Convention of the United States Independent Telephone Assn.

F. B. MacKinnon, Unanimously Re-elected President.

of E. B. Fisher, one of the grand, pioneer figures in the Independent movement who, at the time of his death, was chairman of the association's board of directors. At this convention, shortly afterward, the office of chairman of the board was abolished.

Report of Sec. C. C. Deering.

Following Mr. MacKinnon, Sec. Chas. C. Deering reported the association's present membership as 936, of which 869 are operating companies and 67 associate and honorary members. A total of 294 companies contribute to the support of the association, in addition to the annual membership fee. Of these 248 are operating companies and 46 manufacturers and jobbers.

Theo. Gary, One of the Industry's Financial Pillars.

Committeemen Are Named.

Pres. MacKinnon announced committees as follow:

Nominations — P. C. Holdoegel, Rockwell City, Ia.; Frank L. Beam, Mount Vernon, O.; George K. Gann, St. Paul, Minn.; Houck McHenry, Jefferson City, Mo.; H. E. Bradley, Harrisburg, Pa.; H. C. Todd, Maryville, Mo., and A. C. Cragg, St. Paul, Minn., were named as judges and L. S. Gardner, Waco, Tex., and Max F. Hosea, Indianapolis, Ind., as clerks.

Resolutions—J. H. Wright, Jamestown, N. Y.; S. R. Edwards, Chicago; H. L. Beyer, Grinnell, Ia.; Rollo R. Stevens, St. Paul, Minn.; W. H. Bassett, St. Louis, Mo.; F. H. Runkel,

H. D. Critchfield, Who Reviewed Independent Telephony Eloquently.

Portage, Wis.; R. B. Still, Tyler, Tex.; and F. A. Knapp, Bellevue, O.; E. C. Kast, of Minneapolis, were named sergeant at arms.

Directors of the Association.

Of the ten directors whose terms expire this year, the following six were renominated for another three-year term: H. L. Beyer, Grinnell, Ia.; E. D. Glandon, Pittsfield, Ill.; F. B. MacKinnon, Washington, D. C.; W. J. Uhl, Logansport, Ind.; W. S. Vivian, Chicago; J. C. Duncan, Knoxville, Tenn. The remaining four places were bestowed on: Edward M. Prisk, Hazelton, Penn.; Ben Woodbury, Columbus, O.; R. E. Mattison, Lincoln, Neb., and L. Q. Trumbull, Fort Dodge, Ia. The remaining directors of the association are: Frank L. Beam, Mt. Vernon, O.; J. B. Earle, Waco, Tex.; W. G. Brorein,

L. Q. Trumbull, Gen. Mgr., Monarch Telephone Mfg. Co., One of the New Directors.

Tampa, Fla.; H. L. Gary and H. L. Harris, Kansas City, Mo.; Terry W. Allen, Jackson, Tenn.; W. H. Bryant, Mobile, Ala.; C. Y. McVey, Cleveland, O.; H. L. Reber, St. Louis, Mo. (rep. by W. H. Bassett); G. W. Robinson, St. Paul, Minn.; H. D. Critchfield and Jos. B. Edwards, Chicago; Hart F. Farwell, Terre Haute, Ind.; Geo. R. Fuller, Rochester, N. Y.; W. F. Goodrich, La Crosse, Wis.; Frank A. Knapp, Bellevue, O.; W. Roy McCanne, Rochester, N. Y.; P. S. Pogue, Louisville, Ky.; E. D. Schade, Johnstown, Pa., and A. F. Adams, Kansas City, Mo.

Officers All Re-Elected.

The directors unanimously re-elected the following officers for the coming year:

President — F. B. MacKinnon, Washington, D. C.

W. S. Vivian, a Big Factor in the Convention's Success.

Secretary—Chas. C. Deering, Des Moines Ia., and Chicago.

Vice Presidents—Frank L. Beam, Mt. Vernon, O.; J. B. Earle, Waco, Tex.; W. S. Vivian, Chicago, Ill.

Pres. MacKinnon appointed as a Finance Committee: H. L. Gary, Kansas City, Mo.; F. A. Knapp, Bellevue, O.; R. E. Mattison, Lincoln, Neb.; H. L. Reber, St. Louis, Mo.

Resolutions That Were Passed.

By resolution, expressions of sorrow were spread on record for the following men whose ability and energy contributed greatly to the cause of Independent telephony: J. S. Bellamy, Marion County Telephone Co., Knoxville, Ia.; James A. Brown, Eastern Indiana Telephone Co., Winchester, Ind.; Charles E. Hollender, Newark Telephone Co., Newark, O.; Dwight G. Watson, Van Buren County Telephone Co., South Haven, Mich.; R. C. Barry, Tri-State Telephone & Telegraph Co., St. Paul, Minn.; Howard S. Baker, Sioux City Telephone Co., Sioux City, Ia.

Another resolution was passed, supporting utility commissions in general and "pledging to said commissions, their members and employes, the fullest support and co-operation of the association and its members in the discharge of duties."

Also, the association extended President Harding and his administration its "earnest support, sympathy and co-operation."

Hearty endorsement also was given the association's officers in their movement for intensive study of telephone rates and the subject of inductive interference, and continued investigation was urged of the proper methods of co-operation and co-ordination between telephone companies and electric light and power companies.

INDEPENDENT'S GENESIS.

H. D. Critchfield Reviews Some of The Industry's Early History.

One of the most interesting features of the big meeting was the review of some of the industry's early history by H. D. Critchfield. In May 1897, James E. Keelyn, president of the Western Telephone Construction Co., of Chicago, who was one of the most aggressive men in the industry at that time, called a meeting of Independent telephone companies to meet in Chicago. About 200 responded. So gratifying was the attendance and interest that a general convention was called for the Cadillac Hotel, Detroit, on June 23—just a month later. At Detroit an organization was perfected with James M. Thomas, of Chillicothe, Ohio, as the first president; Col. H. C. Young, of Columbia, Pa., vice president, and W. J. Vesey, of Fort Wayne, Ind., secretary. Among the exhibitors on that occasion were: M. B. Wheeler & Co., Grand Rapids, Mich.; Western Telephone Construction Co., Chicago; Connecticut Telephone & Electric Co., Meriden, Conn.; National Carbon Co., Cleveland, O.; Standard Underground Cable Co., Pittsburgh; Western Signal Co., Chicago; Allen-Hussey Co., Chicago; Moon Electric Mfg. Co., Chicago; American Electric Telephone Co., Chicago.

H. L. Harris, Director, Kansas City, Mo.

The gross earnings of the Bell Telephone Co., when this association was organized, were five and one-half million dollars. Today they are 350 million dollars or more. The profits were substantially 60 per cent of the gross receipts. The telephone business was pretty good in those days as witness: Gross income, $5,547,000; expenses, $2,163,000; net earnings, $3,383,000, out of five and one-half million dollars. In the United States today are about 14 millions of telephones, of which approximately five millions are non-Bell. There are in the world today approximately 20 millions of telephones. In 1893, North America, including Canada and Mexico, had only nine and one-half million telephones. The same territory today has in excess of 14 million telephones. The growth from 1913 to 1921, eight years, was approximately six and one-half million telephones, of which 80 per cent was in the United States. Today there are in this country 14 million out of the 20 millions of telephones in the entire civilized world.

The Independent telephone people have contributed more than their share of this growth. Their activity, energy, effort, agitation, conversation, publication, etc., attracted public attention—made people want the telephone. Also, until the good roads movement started, nothing had contributed so much to the betterment of farm living conditions as the telephone. The rural telephone originally, particularly and peculiarly is an Independent institution.

Referring to the early bitterness of the competition between Bell and Independent interests, Mr. Critchfield said: It finally was found that there was more telephone business than both could take care of and that the thing to do was to stop destructive warfare and get together as reasonable business men should, working together for the good of the industry. Mr. Critchfield declared that one of the most important things remaining for the industry to do is to back up the man on the utility commission who wants to give the telephone business a square deal but is being hounded by an unceasing, unthinking and, in some cases unprincipled, constituency, until he is between the devil and the deep sea.

Our apparatus and construction methods, he said, are practically standardized, although, naturally, progress is being made. The great thing that remains is to get a rate that will carry on the business, make the extensions necessary for the service that is offered and give investors a reasonable return on their money.

STATE OFFICERS MEET.

Fourteen State Associations Represented at a Re-union Luncheon.

At the annual luncheon tendered to the officers of the various state associations by the national body, the United States Independent Telephone Association, 14 state bodies were represented at Chicago, November 16. The list of those present is quite a roll

call of Independent leaders. It runs as follows:

F. B. MacKinnon, president United States Independent Telephone Association and C. C. Deering, secretary; L. S. Gardner, Waco, Tex., sec. Texas Independent Telephone Ass'n; R. B. Still, Tyler, Tex., president, Texas Independent Telephone Ass'n; E. C. Kast, Minneapolis, sec. Minnesota Telephone Ass'n; Claude D. Long, Jefferson City, Mo., Missouri Telephone Ass'n; H. C. Todd, Maryville, Mo., vice- pres. Missouri Telephone Ass'n; J. G. Ihmsen, Albany, N. Y., vice-pres. New York Up-State Telephone Ass'n; F. L. Beam, Mount Vernon, O., president, Ohio Independent Telephone Ass'n; A. J. Curren, Elyria, O., director, Ohio Independent Telephone Ass'n; Jay G. Mitchell, Springfield, Ill., sec.-treas., Illinois Telephone Ass'n; Dr. R. E. Gordon, El Paso, Ill., pres., Illinois Telephone Ass'n; Frank A. Knapp, Bellevieu, O., Ohio Independent Telephone Ass'n; Frank L. McKinney, Columbus, O., Ohio Independent Telephone Ass'n; T. L. Youmans, Osawatomie, Kas., pres., Kansas Independent Telephone Ass'n; L. M. Kraege, Topeka, Kans., sec., Kansas Independent Telephone Ass'n; J. A. Gustafson, Fredonia, Kans., director, Kansas Independent Telephone Ass'n; C. E. Tarte, Grand Rapids, Mich., pres. Michigan Independent Telephone & Traffic Ass'n; George R. Fuller, Rochester, N. Y., pres., New York Up-State Telephone Ass'n; R. L. Parker, Traer, Iowa, pres., Iowa Independent Telephone Ass'n; R. A. Vivian, Grand Rapids, Mich., sec.-treas., Michigan Independent Telephone & Traffic Ass'n; Roy F. Mapes, Saginaw, Mich., gen. mgr., Valley Home Telephone Co.; John H. Wright, Jamestown, N. Y., vice-pres., New York Up-State Telephone Ass'n; E. M. Prisk, Hazelton, Pa., vice-pres., Pennsylvania State Telephone & Traffic Ass'n; Walter J. Gallon, Antigo, Wis., pres., Wisconsin State Telephone Ass'n; Francis Dagger, Toronto, Can., telephone expert Ontario Railway & Municipal Board; J. C. Kelsey, Redlands, Calif., sec. California Independent Telephone Ass'n; J. A. Steninger, Parker, S. D., pres., South Dakota Telephone Ass'n; W. G. Brorein, Tampa, Fla., pres., Florida Telephone Ass'n; Frank D. Moor, Tallahassee, Fla., sec., Florida Telephone Ass'n; R. E. Mattison, Lincoln, Nebr., sec.-treas., Nebraska Telephone Ass'n; Bruce Brown, Brady, Nebr., pres., Nebraska Telephone Ass'n; Max F. Hosea, Indianapolis, treas., Indiana Telephone Ass'n; W. F. Goodrich, La Crosse, Wis., treas., Wisconsin State Telephone Ass'n; H. E. Bradley, Harrisburg, Pa., pres., Pennsylvania State Telephone & Traffic Ass'n; Houck McHenry, Jefferson City, Mo., pres., Missouri Telephone Ass'n; Sam Tomlinson, Plymouth, Ind., vice-pres., Indiana Telephone Ass'n; G. W. Schweer, Windsor, Mo., director, Missouri Telephone Ass'n; and E. C. Blomeyer, Chicago, who is active in and with them all.

Brief remarks were made by Messrs. MacKinnon, Beam, Gordon, Mitchell, Gallon, Fuller, Ihmsen, Kelsey, Bradley, Prisk, Mattison, Brorien, McKinney, McHenry, Long, Steninger, Youmans, Still, Tarte, Hosea, Tomlinson, Parker and Kast. So interesting and helpful was the exchange of ideas on this occasion, that, on motion of Mr. Youmans, the national association officers are to arrange hereafter for semi-annual meetings of the state officers.

WHY BE HOSTILE.

Noah Simpson, Missouri Commissioner, Analyzes the Public.

The convention enjoyed a treat when Judge Noah W. Simpson, a member of the Missouri Public Service Commission, spoke on: "Why the Present Hostile Attitude of the Public Towards State Regulation." Primarily, chiefly and most frequently, Judge Simpson said, the public puts its case against the commission thus: "You set aside our franchise contract; why don't you squeeze the water out of the capital stock of these corporations?" The judge accused certain traveling men of being largely responsible for inflaming the public. If so, their employers should see to it that their fulminations cease, as it reacts against their firms' interests. A great deal of the unpopularity of state commissions with the public is caused, Judge Simpson believes, by the public utility operators, their good will being run down faster than it is built up by employes who come in contact with the public. No effort is made by executives to place the commissions in a fair light with the public, and the result is that the public, generally, is not truthfully advised. In many instances, he said, customers even are led to believe that the utility would be pleased to grant relief if they were not prevented from doing so by the commission. The judge pleaded for a better understanding between operators and patrons, which can never come until the public better understands the whole fabric of the business.

Reward Companies According to the Service Rendered.

Wm. W. Potter, Chairman of the Michigan Public Utilities Commission, in the course of his remarks before the telephone convention at Chicago, Nov. 17 said: "You have got to have your taxes, maintenance, repairs, distribution and all those things; but when it comes to the question of taking money from the public you have no right to take it unless you give them good service. If you do not give them good service, you ought not to have any more than a bare return sufficient to exist; but if you do take off your coat and give the public good service, then they ought to pay a good return because they are getting something for it."

Encourage Your Subscribers to Work for You.

W. H. Bryant of Mobile, Ala., in addressing the Chicago Convention, Nov. 17, said: "If you are operating any utility and you want fair treatment, you must deal fairly with the public. You must give them what they expect good service. Keep in their confidence. Keep them informed of what you are doing. If you need more money to operate the business, go to them. Tell them your story, and they will go to your regulatory bodies, commissions and councils, and help you to obtain what you are after. That has been my procedure for twenty-five years. I have never yet failed to get anything I wanted. I have gone to my customers first. I have told my story to them. Then, if you go to your regulatory body and ask for something or, better still, get them to ask it for you, you are sure to get it, because they are giving to their constituents things that they ask for, and thus the commissioners do not get in bad with the public.

The Pioneers Celebrate

Their Organization Contributes Largely to Success of the Big Chicago Independent Convention — Luncheon, Entertainment and Business Matters

Everybody voted it a great success—one of the big hits of the meeting. The Independent Pioneer Telephone Association, held its first annual convention at Chicago, Thursday, Nov. 17, during the general gathering of the Independent claus. The number of good men who have stuck by the Independent movement for from 15 to 25 years is surprisingly large and their spirit on this occasion seemed just as fresh and vigorous as ever. From the time that Pres. Hart F. Farwell, of Terre Haute, Ind., started things moving until Harold L. Beyer, of Grinnell, Ia., was elected his successor late that afternoon, things went with a zip that kept everybody happy. J. K. Johnston, of Indianapolis, won reelection as secretary-treasurer by the manner in which he dug up new members and got the coin. The Pioneers numbered 300 when the convention opened but Mr. Johnston had a total of 435 enrolled before the luncheon was served. The committee on arrangements, to whom all accorded rousing thanks and cheers, was composed of Frank L. Eldridge, George W. Rodormer, W. S. Vivian and H. D. Currier.

Frank L. Eldridge, a Leader in the Pioneer Festivities.

At the speakers' table with Pres. Farwell were H. D. Critchfield, Theodore Gary, Henry A. Barnhart, C. Y. McVey, Perry C. Holdoegee, G. W. Robinson, J. L. W. Zietlow, Dr. I. A. Lumpkin, F. B. Mackinnon, Chas. C. Dewing, J. K. Johnston and E. C. Blomeyer. All of these men took an active part in entertaining the crowd with pithy addresses. Mr. Critchfield, who was active in the formation of the first Independent organization, referred to their initial meeting at Detroit in June 1897. He was impressed by the fact that, regardless of differences of opinion, men had acted for what they honestly believed was for the best interests of the business. Destructive efforts finally have been abandoned and the endeavor, now is to make the property valuable and earn a sufficient return on the investment.

H. D. Currier, Chicago, Who Helped the Pioneers to Success.

Mr. Zietlow got a laugh when he told of his early attempts to patent a metallic circuit and admitted folks had thought him crazy on the subject of depreciation. Laughs turned to cheers, however, when he announced that his company had just paid its 100 successive quarterly dividend. Dr. Lumpkin described a crude drop and signal system which he used before any independent apparatus was available. His original plans for Mattoon, Ill. contemplated a 100-line board but over 300 subscribers had been secured before the office was opened and his exchange now has 5,000 subscribers. The doctor also, vividly, described the first Independent telephone banquet held in the old Sherman House at Chicago, B. V. (Before Volstead); and recalled that he was the first Independent with whom the Bell had made contract for toll service in Illinois.

George W. Rodormer, of the Pioneer Entertainment Committee.

Henry Barnhart, president of the Rochester (Ind.) company for 27 years, is good wherever you put him —good enough that he commands

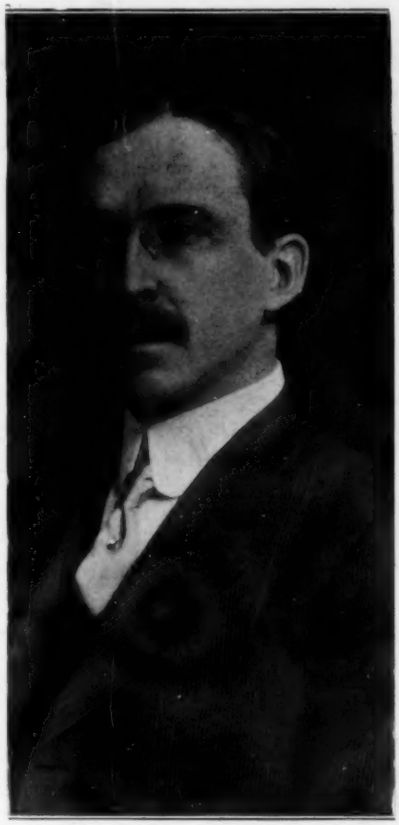
good money as a Chataugua speaker —deprecated his attainments humorously by repeating what "Uncle Joe" Cannon had said about him when he first entered Congress. Mr. Barnhart had been brought up on a farm, had engaged in newspaper work, and then the telephone business. Later he was on the board of control of the state prison and after that became one of the directors of the state insane asylum, before being elected to congress. "Listen," said Uncle Joe to a group of congressmen after he had read the Barnhart biography in the Congressional Record, "listen to the story of this good man's fall. He began on the farm, graduated to the editorial chair, then into the telephone business; the state prison followed, and then the insane asylum. It naturally followed that he came to congress after that."

Perry Holdoegel had the poles for his telephone system all cut, he said, long before he could get the first instruments. They were hardwood poles and before the instruments arrived the poles got so hard the brackets coudn't be nailed on them and no lineman's spur ever could be found that was sharp enough to take hold on them. However, such memories have not affected Mr. Holdoegel's voice. He still sings as sweetly and interpidly as B. V. (yes, it still stands for Before Volstead).

Characteristic of the good banker and sound business man that he is, Theodore Gray's remarks were worth listening to. The principles with which he has attained success in this industry consist briefly in "getting money and getting men who can and will give service." Mr. Gary also tied Mr. Zietlow as a pioneer on depreciation stating that, the first months he entered the business, he set up $4.00 a year per telephone for that purpose.

C. Y. McVey referred to the time when two Independent associations existed and told of the part that he and others took in effecting their consolidation. He declared himself amply repaid by the success of the merger to date. After G. W. Robinson and Pres. MacKinnon had spoken briefly, E. C. Blomeyer was introduced as master of ceremonies for a snappy entertainment that followed. The "flowing bowl" was passed, but what flowed therefrom and caused great exhiliaration was a free-for-all impromptu debate between F. V. Newman, H. D. Currier, G. W. Schweer, W. S. Vivian and Rollo R. Stevens. Another free-for-all argument that immediately followed was a "battle royal" between five dusky pugilists, introduced as "Blomeyer," "Rodormer," "Coffey," "Currier" and "Frank Foster."

Before the session closed, article eleven, which defines the interpretation of the word "Independent," was eliminated from the by-laws.



P. C. Burns, Chicago, Pioneer Telephone Manufacturer.

Pennsylvania Association Meets at Harrisburg, Jan. 12-14.

The Pennsylvania State Telephone and Traffic Association will hold its next convention at the Penn-Harris Hotel, Harrisburg, Pa., January 12-14. H. E. Bradley, of Harrisburg, president of the association reports the outlook favorable to a large and enthusiastic meeting.

Pacific T. & T. Now Claims World's Prize Toll Line.

Aberteen, Wash.—After a year's work and expenditure of $225,000 the Pacific T. & T. company has completed the 52 mile toll line connection Aberdeen and Olympia, Wash. Company empioyees claim this is the finest toll line in the world.

LIFE OF A SWITCHBOARD?

They Must Use Monkey Glands In Kansas.

The Kansas commission finds that, for the purpose of rate making at Great Bend, the value of all of the property used and useful in the conduct of the Southwestern Bell Telephone Co.'s business at Great Bend, is $95,000.00, which includes $4,480.00 as the value of the physical property used and useful to it, obtained from the American Telephone and Telegraph Co. The commission further finds that the net earnings of the respondent company at Great Bend for the year ending July 31, 1921, were $14,421.06, and that said proceeds are largely in excess of a reasonable depreciation and return, and that, therefore, the rates now in force should be reduced. The commission further finds that a reasonable amount to be set aside for depreciation at Great Bend, is $4,140.00. The evidence shows, according to the commission, that the property used and useful at Great Bend is a little better than 80% condition, notwithstanding the exchange has been in operation for a great many years. The evidence, it is claimed, further shows that the office equipment, including the switchboard, is in 82% condition. Notwithstanding the fact that the evidence shows that the average life of a switchboard is eleven and seven-tenths years, the switchboard at Great Bend, has been in service more than fifteen years, is said to be still in a high state of working condition. This, the commission says, indicates that the amount allowed for depreciation is not only sufficient, but liberal.

$80,000,000 To Be Spent in Two Years by New York Company.

New York City—According to H. C. Carpenter, one of the engineers of the New York Telephone company, this company plans to spend $80,000,000 in the next two years for extension of its service. It is expected 610,000 new subscribers will be added within the state in this period. More than 275,000 new instruments will have to be purchased, it is believed. The rest of the new customers are to be supplied with instruments from discontinued stations.

Application of the Farmers Mutual Switchboard Ass'n. at Durham, Kans., for permission to sell its telephone plant and property at Durham to G. F. Grant, has been granted by the Kansas commission.

To Cut Down Interference

Induction Problems and How to Meet Them as Seen by S. P. Grace of the A. T. & T. Co., New York

One of the big features of the Chicago convention was the paper by Sergius P. Grace, of the American Telephone and Telegraph Co., New York, on "Interference with Telephone Traffic by Electric Light and Power Lines, from the Telephone Company's Viewpoint." Condensed, as we are forced to present his remarks, Mr. Grace said, in part: "The second great stage of power development has brought about the use of high voltage transmission lines, connecting together numbers of cities and towns and these high voltage lines, running across country, have in some cases been placed for many miles in close proximity to communication circuits. Under these conditions of high voltage and close proximity, the problem of continuing to give good telephone service becomes extremely difficult, and in some cases may be impossible of solution without adequate separation of the power and communication lines. * * * Speaking frankly, the telephone companies are now pressing this question because the pace of high voltage electrical interference has become too swift for them to keep up with by any means at their command, and they have reached the point where they cannot do all of the prevention and mitigation in their own lines but must call on the power companies to cooperate and help in the solution of interference problems, if high grade telephone service is to be preserved to the public at a reasonable cost. * * * It must be recognized, from an electrical standpoint, that the power companies and telephone companies are by no means on an even footing. The telephone circuits are infinitely more sensitive than the power lines and, under certain conditions, can be put completely out of business by the latter. On the other hand, there appears to be no possibility of currents on telephone lines ever putting a power line out of business. This factor is fundamental in the discussion of this entire subject. It explains the anxiety of the telephone companies to obtain proper separation in cases of parallels; it also explains their insistence upon other remedial measures demanded by the necessity of each case.

* * *

Means of Reducing Induction to a Minimum.

"The effect of power induction on adjacent telephone lines can be greatly reduced by a careful balancing of the load in the different phase wires, by proper configuration of the conductors and by means of transpositions which are laid out to co-ordinate with transpositions in the telephone lines. On the part of the telephone company, there is considerable which can be, and usually is, done to reduce to a minimum the effect on the service of the energy transmitted through space from the power lines. Fortunately, for the sake of reducing cross talk, telephone circuits inherently require careful balance, and many of the same devices used to eliminate cross talk have the effect of reducing very materially the induction from outside circuits. This reduction of noise and cross talk is secured by keeping the resistance of the two sides of the communication line equal, by repeating coils having balanced electrical characteristics, by inserting loading coils only at proper neutral points, by maintaining high insulation of the line wires, etc. The degree of balance in telephone lines and apparatus has had, however, to be carried to a higher point because of induction from power lines than if cross talk alone was to be prevented. In addition to these standard measures, special transpositions, co-ordinated with the power transpositions, are necessary if the parallel is of any appreciable length. Notwithstanding all these measures, there will be severe interference in the case of long parallels at the times of abnormal disturbances in the power circuits caused by broken insulators, switching, etc. At these time large amounts of power may pass over the power lines in an unbalanced condition, causing heavy residual currents through the earth. Under these circumstances neither the transpositions in the power wires nor the transpositions in the telephone wires are of any appreciable value and breakdowns of the telephone apparatus as well as loss of service will result. Obviously, in the operation of the power lines, these periods of abnormal operation must be held to the absolute minimum. * * * Unfortunately, even with the most perfectly designed, constructed and maintained co-ordinated transposition systems, there still remains in the case of long parallels a resultant amount of noise in the telephone lines which brings about an impairment in the service. It should therefore be clearly recognized that there are some cases where adequate separation of the power and communication lines may prove the only means of preserving the telephone service from substantial impairment."

* * *

Close Cooperation Between the Utilities is Recommended.

"The executives and engineers of both utilities must unite and work together in the solution of this problem so that, in the end, the public may enjoy a maximum amount of both services at a minimum total cost. It seems to me that only as a last extremity should there be a resort to legal action. In the meantime, my earnest suggestion is that each of you do everything possible to cooperate with the power companies in your neighborhood. From my experience, I am sure you will find them sympathetic with your desire to continue rendering good telephone service. The majority of these power engineers and executives have been so engrossed in the development of their own business and so involved in the solution of their own complex problems of power distribution that they have had little chance to give thought to the possible inductive effect of their circuits on your lines. On the other hand, we in the telephone field have been large-

ly to blame for this lack of knowledge on the part of the power people as to inductive interference because few of us have ever gone out of our way to educate the power companies into an appreciation of the difficulties of giving telephone service, particularly when affected by neighboring power lines. Do everything in your power to remedy this omission on our part, and at your first opportunity show your power neighbors your telephone plants and explain to them the way in which your circuits operate. With this groundwork of knowledge, every reasonable power engineer and executive, and I am sure nearly 100 per cent. of them are reasonable, will cooperate with you to the fullest extent in keeping the telephone service free from impairment."

* * *

Learn Something About Your Neighbor's Troubles.

"May I also suggest that, in your intercourse with your power neighbors, you take the opportunity of learning all you can with reference to the methods used in the distribution of electric light and power? In thus knowing as intimately as possible the methods of power operation, you will be in a position to avoid making unreasonable requests on power companies. The power companies have difficult problems to solve and we should not hinder them in any undue way in the furnishing of power service to the public. * * * By establishing close relations with the power company in your neighborhood, arrangements can be made so that you will know when any high tension transmission line is contemplated, and, before any money is spent either for plans or right of way, it will be possible for your engineers and the engineers of the power company to get together and determine what is the best route for the proposed transmission line. Many times it will be possible for the transmission line to be routed over a different road from that occupied by your toll line at practically the same cost or in some cases at a little greater cost. The greater cost may be justified in many cases in view of the cost of the transpositions and other remedial measures which would be required if the power line was constructed along the same highway with your toll line and, besides, it must be remembered that even the best co-ordinated transposition systems do not eliminate all of the inductive effects under normal power operations and that during times of abnormal operation of the power lines the transpositions are of practically no value and the adjacent communication lines will be seriously effected. The telephone companies should also inform the power companies in advance of the construction of proposed telephone lines so that the best location can be chosen for the telephone lines. I shall not say anything as to how the costs of this work should be divided, for I believe that, prior to recommendations which it is hoped the General Committee will make on this subject, you will be able to work out with your power company satisfactory arrangements for the distribution of costs in each specific case.

See That Your Construction Is Correct.

"One other admonition I should like to give you: I know the difficulty of maintaining telephone lines in a high state of electrical balance, free from tree grounds, broken insulators, etc., but in recent years all of us have realized that, in order to give high grade service, our telephone lines, even where power wires are not involved, must be maintained close to perfection. If power wires are in the vicinity of your telephone lines, then no longer can poor maintenance of the telephone lines be tolerated. And in adjusting specific cases of interference with your power neighbor, I believe he has the right to expect that, as one of the measures toward securing freedom from impairment of the telephone service, the maintenance of the telephone lines must be kept high class; that is, close to perfection. One thing more: undoubtedly there are many cases existing in your various territories where there is bad interference between the power wires and the telephone wires. I think that every effort should be made to clean up these cases in an orderly and systematic manner. * * * Let us realize to the fullest extent that the power companies and the telephone companies must live together in the same communities. The public desires both services, and in the giving of these services capital must be conserved to the very utmost. Economy today is the watchword and an inefficient design of either the telephone or power system which results in an increased total cost of both services to the public will not long be tolerated, and unless we ourselves find the correct solutions public opinion will require that others attempt to find the solutions for us. Certainly we ought to be able to do a better job than the outsiders."

The Power Company's View of the Situation.

W. J. Canada, engineer for the National Electric Light Association, followed Mr. Grace, discussing "Inductive Interference As Regarded by the Power Companies." He reported that the Electric Light Association is endeavoring in each state to maintain an active state interference committee, in touch with the national committee, and through headquarters also in touch with experience and practice elsewhere. Through this organization they expect to prevent uncooperative acts and omissions by power companies, to afford them information when needed, to assist them in securing facts necessary for settlement of local problems, and of course to thus augment at headquarters the useful fund of data on which their cooperative service to members, to the public and to other organizations is based. When formed, these state committees will be glad to keep in touch with telephone committees on all current activities. * * * It was suggested that the various state telephone associations can greatly assist this cooperative move toward the formulation of acceptable standards by the avoidance of controversies that might provoke the issuance of unbalanced rules by state commissions. Representation on state joint committees composed of engineers and power companies, by Bell companies and Independent telephone companies would be a splendid step, Mr. Canada suggested, toward effective cooperation.

Further Ideas on Interference by J. G. Mitchell.

Jay G. Mitchell, secretary of the Illinois Telephone Association, in discussing the interference problem, said "All of the states in the Mississippi Valley are confronted with perhaps a more rapid development of transmission lines than other states, and I want to leave one thought with you: We always try to avoid an open conflict on these matters in Illinois. The larger and more responsible power companies meet us in most cases more than half way, I am very glad to say. But there is a condition which requires some consideration—the construction of power circuits by companies which are somewhat analogous to the small mutual farmer line telephone companies, as we called them in the telephone business of some fifteen or twenty years ago. In other words, we find circuits are built in Illinois by associations of farmers who need the service and that these circuits are built under contracts which provide that the farmers shall

pay for the construction of the circuits, that then become the property of some electric transmission company. It is difficult, indeed, to cooperate with that kind of an organization and I think the joint committee might give that phase of the matter some consideration. The Illinois Commission has passed an order, in order to protect the signal companies, which places the responsibility for hazards incidental to the operation of such circuits upon the company furnishing the current; and it works practically this way, that if the construction is not satisfactory, does not conform to recognized standards, it is possible in an informal way to prevent current being turned into that circuit until the dangerous or injurious conditions have been removed. * * * And that brings another thought: In practically every state you will find in your state capitol a group of hard working, earnest, conscientiously careful, thorough young men. Those young men are the staff of your public service commission. It is not necessary in about 75 per cent. of the cases—at least in Illinois it is not—to go to formal proceeding before the commission. Where you have a controversy with an electric light company, if you can arrange an informal conference with your service engineer you can ofttimes effect a solution of the difficulties.

Depreciation is Debated

Interstate Commerce Commission Issues Questionnaire to Telephone Companies—How to Classify Companies and Harmonize With State Commissions' Functions Are Problems

The big question of Depreciation and its attendant problems for the accountant were presented to the Chicago Convention by Frank S. Fowler, Chief of the Depreciation Section, Bureau of Accounts, Interstate Commerce Commission, Washington, D. C. Summarized, Mr. Fowler said: "According to the records in Washington there are 1,068 telephone companies submitting operating reports. There are some 8,000 companies submitting circulars or merely financial reports. The latter companies have not been sent the new Federal questionnaire because the accrual of depreciation in the operating expense of telephone companies concerns only the operating companies. * * * We propose after we receive the replies to this circular to form tentative recommendations, naming the classes of property which are subject to depreciation and the rates which shall be applied to each class. Those recommendations will go before the Interstate Commerce Commission and will be made public. Each individual company will be furnished with a copy. At some later date a hearing will be held, and it is our purpose to give each company at least forty-five days' notice in advance of that hearing. At that hearing we would like to have a representative from each telephone company of this Association or of any other association or any unaffiliated company come to Washington and feel free to express his opinion as it pertains to his individual company or his district. After that the Commission will consider the briefs that have been filed, and in due time issue its order, which becomes mandatory then upon all companies."

Reply to the Proposition by C. B. Randall.

A detailed answer to the questionnaire was made by C. B. Randall, Secretary and General Counsel of the Tri-City Telephone and Telegraph Co., St. Paul, Minn., who said: "Our commissions have very plainly indicated, or our commission in Minnesota very plainly indicated, that they would not follow any such order. It seems to me the purpose behind the law was that there was danger of public service being interfered with by reason of telephone companies not protecting their future with a fund for rebuilding and that this developed in so many states during the war that they wanted an end put to it; they wanted to see that future service was protected. We know a number of small companies in our state, and I assume it is true all over the country, are setting aside an absurdly low sum, or none at all. If that were continued it would become a very undesirable situation, both as to rate charges and as to the neighboring company with an adequate rate for that purpose. * * * The variance in any particular state would be comparatively slight; possibly .3 or .4 or even .5 of a per cent. We telephone men probably could, any of us, name a telephone engineer of national experience and knowledge who could, with a very short research, obtain sufficient data that he could determine the group of a given company by simply running through the report. I believe, with the assistance of such an engineer, these preliminary failings of the company could be substantially and quickly enough checked to render justice both to the companies and the public, the right being reserved in the commission to take it up again of their own volition if they see fit. Certainly, any of our engineers in either the Bell Company or the Tri-State in Minnesota, or Mr. Wray or Mr. Hagenah or anyone of telephone experience, could spot any company in our state that turned in too high a figure for reserve. They could also spot the men who were too low, although it would be harder to spot the ones too low than the ones too high.

Comments by MacKinnon, Odegard and Others.

Pres. MacKinnon said: "I stated, and Mr. Randall stated, that it was the opinion of the Association officials when filing its statement that a general rate ordered into effect by the Commission for all companies in the United States or even in districts would be unfair and in some cases absolutely injurious."

S. L. Odegard of Wisconsin, said: "As some of us look at it, it would be very unfortunate for the Interstate Commerce Commission to interest itself very much in this problem because it is so far removed from the vital matters of rate making and also authorization for capital security, for both of which we must go to our state commission."

Mr. Randall rejoined: "The Association, however, is heartily in favor of the Interstate Commerce Commission handling this. Despite the seeming satisfaction with the Commission's

actions in Wisconsin, there are other state commissions who are not working that way."

Mr. MacKinnon said: "We have said in our statement we do not think it is practicable that they (the I. C. C.) order a general rate, and they do not think it is practicable for them to go to your plant to make a rate. * * * I think we would like you, Mr. Fowler, to tell Chairman Jackson, of the association of commissioners, that we would like to see the various state commission get onto this discussion actively. When it comes right down to it, they are the men we are going to have the discussions with when the matter comes back home. We would like to have the whole question thoroughly thrashed out, not only on the technical side as to different classes of property, depreciation, obsolescence and storm damage, but on the practical machinery that is necessary to enforce such an act."

On Standardizing Rates

Prof. Wright and Judd Show Such Things Can Be Done—They Also Suggest a Scheme For Rewarding Good Service and Penalizing Poor Service

"Standardization of Telephone Rates" was the subject of a very thorough treatise by Profs. C. A. Wright and D. B. Judd, of the Engineering Experiment Station of the Ohio State University, to which the convention was treated Nov. 17. This paper was, in fact, a report of a preliminary investigation of the practicability of standardizing telephone rates, made in cooperation with the United States Independent Telephone Association. Lack of space compels us to condense this splendid paper to one-tenth of its original 30 pages, but the main points may be set down as follow. Those wanting the complete report can obtain it in printed form of the Association at 19 So. LaSalle St., Chicago.

The present policy of rate making, many claim, does not give an incentive to more efficient methods or better service on the part of telephone companies, hence the desirability of a standardized yet flexible plan of procedure. Extracting from the Wright-Judd report we read that "while it is not claimed that regulation of telephone companies by public utility commissions has been a failure, or even, unsuccessful, it has appeared to many that it has not accomplished its full purpose. It has been suggested that commissions have been unable particularly to perform one of their functions;—that of fixing and enforcing standards of service."

Better Service Means Better Rates.

Not only should value of telephone service to the subscribers be considered in fixing rates, in addition to the cost of producing the service, but it actually has been considered. Telephone companies will contend more strenuously for reasonable rates if the service is good, and, under these conditions, the public utility commissions will more readily grant them, and the public will more willingly pay them. Among the factors which affect the cost of producing the service are the number of stations served, the calling rate, and the extent of the territory served. Among those factors which affect the value of the service to the subscribers are the number of stations served, and the quality of the service. The use made of the telephone by the average subscriber, and the telephone development are taken as measures of the quality of the telephone service." * * * "If the rates of a sufficiently large number of telephone exchanges serving the same number of stations are averaged, the average rate is the fair one for exchanges of that size. The effects of competition, monopoly, and unfair influence which are of advantage to the telephone company in some cases, and in other cases to the community, will be eliminated if a large number of cases are considered. Typical average rates have been obtained and are presented in this report." * * * "The wage scale will vary only with the size of the community, and the cost of all telephone plants serving the same number of stations should be the same, except for the differences due to extent of territory served and the maximum calling rate."

Bonuses and Penalties Provided.

When any particular telephone exchange is considered the natural obstacles which the telephone company has to overcome, and the degree of excellence of its service should be recognizd by the bonuses or penalties applied to the average rates for exchanges of the size of the exchange in question. Taken as the bases for bonuses and penalties: (a) the length of pole line per station, which is an approximate measure of the extent of the territory served by a telephone exchange; (b) the maximum busy hour calling rate, which is an approximate measure of the proper size of the central office; (c) the average number of calls per station per day, which is a measure of the value of the telephone service to the individual subscribers; (d) the development in telephones per thousand people in the area served, which also is a measure of the value of the telephone service to the subscribers. The desirability of recognizing plant condition by a bonus or penalty also should receive consideration. Consciously or unconsciously, utility commissions, telephone companies, and telephone using public, in fixing rates have recognized such bonuses and penalties, and made allowance for them. So, if a sufficient number of cases in a sufficient number of states of the same character, are averaged, the average value of bonuses and penalties obtained will be the fairest ones obtainable. A method of obtaining such averages is presented in this report.

System Will Make Commission's Work Easier.

If the public utility commissions fix average rates corresponding to the numbers of stations served, modified by the bonuses and penalties suggested, their work will be decreased to such an extent that reasonable attention may be given to fixing standards of service and enforcing them. * * * The suggested bonuses and penalties offer an incentive to telephone companies to better their service, independent of the efforts of commissions. * * * The possession by commissions, telephone companies, and telephone using public of a knowledge

of the average (and therefore just) rates, and bonuses and penalties will tend to promote harmony in fixing rates.

Other Factors to Be Considered.

One authority claims that "The factor of management has more to do with earnings than all the hypothetical reproduction and conjectural depreciation compiled by all the engineers and commissions that have considered them. The public cannot be expected to pay rates on unnecessary property, extravagant construction, improvident investment or excessive facilities not yet demanded." * * * It was found early in the investigation that free service between communities has an appreciable effect upon the rates. This is to be expected because the value of the service to each subscriber is increased by an increase in the number of subscribers with whom he may, if he wishes, obtain connection. * * * The degree to which people buy telephone service and the degree to which they use it are approximate measures of the excellence of the service. The development in stations per thousand people shows not only how aggressive the management of a company has been in selling telephone service, but how good service is maintained, as the better the service, the easier it is to sell. * * * It is assumed in this report that the bases upon which bonuses and penalties should be granted are (a) miles of pole line per station, (b) maximum busy hour calling rate, (c) average calls per day per station, and (d) development. When there are two competing telephone exchanges in a community the rates tend to decrease because of the competition, and incidentally the service is worth much less because of the competition."

Concluding, the report says: The value of this rate standardization plan depends upon the possibility of obtaining bonuses and penalties which may be weighted properly and fairly, and which may be evaluated for individual cases without the expense and inconvenience of the present method of evaluating telephone plants, and which will take account of abnormal plant and service conditions. If, incidentally, these bonuses and penalties are closely associated with the elements of service given the subscribers and emphasize good esrvice, the value of the rate standardization plan in encouraging good service will be great.

CONVENTION EXHIBITS

Complete Display of the Latest Apparatus and Appliances.

The list of exhibits at the Chicago Convention, Nov. 15–18, was the most complete and interesting any telephone meeting has enjoyed in years:

AUTOMATIC ELECTRIC CO., Chicago, exhibited in the Rose Room a community automatic exchange, designed to eliminate all operator expense in small outlying exchanges, and at the same time to bring the service standards up to those of city automatic exchanges. The working exhibit was a 10-line switchboard, with five telephones and three trunks. A complete 50-line unit also was on display. The method of inter-connecting trunks in a large automatic exchange, also was shown by a series of two-line switches and three selector switches, connected with two telephones. Also for the study of individual switch operation Strowger connector switches were mounted on individual frames, each with an automatic telephone. The company's representatives included E. C. Blomeyer, sales manager; R. H. Burfeind, assistant sales manager in charge of general sales; W. S. Vivian, manager public relations department; Roy Owens, Ohio representative; C. D. Boyd, Illinois, Indiana and Michigan representative; and O. F. Cassaday, Wisconsin and Minnesota representative.

AMERICAN ELECTRIC CO., Chicago displayed a full line with many new features, including a common battery desk type switchboard; one 300-line two-position switchboard fully equipped; a 150-line low-type magneto board fully equipped; one 50-line low-type board; one ringer switchboard; one 15-line combination wall-type switchboard; one pony-type magneto switchbard; the 69 X telephone wall type telephone, and a full line of desk telephones, including hand microphones in both magneto and common battery, that are meeting with much popularity. Visitors also were shown an assortment of Burns adjustable telephone brackets, loud-ringing extension bells, and interconnecting telephones and steel type common battery telephones, as well as keys multiple jacks, operators' breast plate transmitter and receiver equipment and a large assortment of glass mouthpieces, and cordage. The company's representatives were: P. C. Burns, president; Eugene L. Brown, secretary; W. T. Curtis, A. B. Ferdinand, W Johnson, Frank Ruehlman and R. Leiman.

AMERICAN POLE PROTECTIVE CO., Freeport, Ill., represented by S. M. Mulnix, president, exhibited small models showing how the Armco iron sleeves may be adjusted on poles of various circumference and different taper. This company's proposition was quite fully described in last month's issue.

AMERICAN STEEL & WIRE CO., Chicago, exhibited W & M telephone and telegraph wire cords, and copper wire in various sizes. Representing the company were: C. W. Matthews, C. F. Wiley, and C. S. Knight.

ADDRESSOGRAPH CO., Chicago, showed how more than 500 telephone companies are enabled to get their monthly bills to customers on time. J. E. Miles was in charge.

ACME CARD SYSTEM CO., Chicago, by Werner G. Klostermann, displayed transparent tube equipment applied to information work and various stands to meet every condition existing in any central office. Overlapping card equipment for multiple marking board, the bookkeeping type of equipment and Acme steel cabinets for stock records, supplies and small tools records, subscribers' records, employment and payroll records.

BELL LUMBER CO., Minneapolis, Minn., exhibited butt-treated poles and views of its yards and treating plant. Secretary W. C. Meader had charge of the exhibit.

LYNTON T. BLOCK & CO., (Utilities Indemnity Exchange,) St. Louis, Mo., showed by graphic charts the distribution of premiums paid in by their assured. In attendance were Lynton T. Block and W. S. Ferguson, of the St. Louis office, W. D. Jackson, Illinois field, and E. M. Stallcup, Indiana.

BOWDLE ACCOUNTING SYSTEM, Cerro Gordo, Ill., by F. A. Bowdle, exhibited accounting forms for telephone and electric light companies. Mr. Bowdle owns his own finely appointed printing plant and bindery and his popularity among telephone companies was obvious from the number of his callers.

CHANCE CO., Centralia, Mo., displayed its Never Creep Anchor and pole line hardware. J. J. Milligan had charge of the exhibit.

COFFEY SYSTEM & AUDIT CO., Indianapolis, Ind., exhibited the Coffey central accounting system used by large and small Independent and Bell telephone companies and endorsed by the Indiana Public Service Commission. A complete line of accounting forms also was shown by J. W. Coffey himself, who was in charge.

COOK ELECTRIC CO., Chicago, represented by George R. Folds, president; J. F. Jaap, J. C. Bogle E. E. Shields, D. C. McKee and C. Ruth, showed a big line of protective devices and terminals. A new terminal for interior block construction work, made of malleable iron casting (instead of cast iron), and much lighter and smaller than the former designs, received much favorable comment. This terminal is said to give greater spacing and jumper wire room all pairs being plainly marked. The cover has a locking device that holds when raised and locks itself when lowered. On one large panel was shown every piece part (some 1,197 in all) entering into a 20-pair section of No. 100 Cook protector. A radio telephone receiving station installed in the Cook exhibit room furnished music and speeches from various parts of the city and country. Grand opera, transmitted by Westinghouse Electric Co.'s instruments from the stage of the Chicago Grand Opera Co., attracted enormous crowds till late at night. The Magnavox Co. also had some of its apparatus in use at this exhibit.

DAWSON MFG. CO., St. Louis, represented both the Dawson organization which makes loose leaf binder forms and Hugh G. Buchan as an individual, who showed certain binders and forms on which he holds the patent rights. In addition to forms and binders was shown the "Extra Quality" aluminum sheet holder for outdoor or severe indoor use; also a full line of solid and sectional post binders and holders, together with a great variety of celluloid protected index cards and sheets. Mr. Buchan, of the Buchan-Murphy Mfg Co., New York City, now is vice-president of the Dawson Mfg. Co., in charge of production. His friends in the telephone industry will be glad to know that he is now in a position to serve them fully.

ELECTRIC STORAGE BATTERY CO., Philadelphia, Pa., showed batteries for telephone and signal work, including types D and E plates of Chloride accumulators, and P T and C T couples for telephone use. Chas. Taube and J. A. Fitts were in charge.

FRANCO ELECTRIC CORP., Brooklyn, N. Y., showed a very complete line of batteries designed especially for telephone use. Representing the company were J. L. Algermissen and H. A. Brown, sales manager.

FRENCH BATTERY & CARBON CO., Madison, Wis., was prominently located, right by the registration desk. Visitors were entertained with music and refreshments. A big line of telephone batteries was shown, together with multiple Ray-o-Spark batteries and ignitors. Beside President Ramsey and Secretary Ford the company had in attendance G. A. Shipley, special factory representative; Frank Foster, Iowa, Nebraska and Illinois territory; D. E. Wyre, Indiana, Ohio, Kentucky and Michigan; A. L. Thompson, K. J Helmholtz, Kansas City and F. L. Eldridge, Chicago.

HALLETT IRON WORKS, Harvey, Ill., demonstrated its improved type of steel gain designed to do away with cutting into the pole when installing cross arms. R. A. Halleft, in charge of the exhibit, said: "The Hallett steel gain does for the top part of the pole what preservatives do for the butts." The big Hallett line for standard line construction also was displayed.

HARRAH MFG. CO., Bloomfield, Ind., C. P. Harrah in charge, showed the "Handyman," a pole-pusher, pole-puller and guy stretcher, known as the "lineman's friend." The "Handyman" is a brand new one-man outfit, embodying a

new principle in jack construction. It is claimed to do the work of a gang.

HOLTZER-CABOT ELECTRIC CO., Chicago, showed power plant equipment for telephone exchanges, ringing motor-generator sets, a gasoline generator set for isolated exchanges and a magneto power-generator set for ringing telephone bells, which was of particular interest. Also, there was a special motor-driven interrupter for machine ringing with a loud-ringing extension bell for noisy places and a full line of ringers and linemen's test sets. The Holtzer-Cabot representatives were T. G. Meinema and M. E. Gault.

C. J. K. JOHNSTON, telephone engineer, Indianapolis, Ind., showed the radio loud-speaking telephone and an unusual exhibition of appraisal work.

KELLOGG SWITCHBOARD & SUPPLY CO., Chicago, occupied the entire West room of the Sherman House, with a most complete and interesting exhibit, including its three-position, unit-type, complete service switchboard, which is said to reduce the operating force practically in half. Operators at these switchboards, it is stated, answer from three to four hundred calls an hour. The board was connected for actual demonstration. Other features were: the Kellogg universal switchboarwd which furnishes common battery and magneto service over the same board, the Kellogg 150-line magneto and the 50-line P. B. X. switchboard. The usual Kellogg display of magneto and common battery telephones and miscellaneous apparatus, such as ringers, transmitters, receivers, coils, lamps, and Bakelite products also was made. Telephones equipped with Kellogg automatic dials attracted attention. The Kellogg company had almost 50 representatives on hand to welcome visitors and explain equipment. Among these representatives were J. B. Edwards, H. D. Currier, J. G. Kellogg, G. DeWolf, S. Guthrie, E. I. Pratt C. W. Nelson, J. F. Tompkins, H. W. Hogue, Ben Woodbury, W. S. Fisher, W. S. Boze, W. R. Kimmel, D. E. McGregor, J. H. Watkins, M. K. Gher, H. N. Faris, J. A. Stratton, G. L. Banks, Glanton Smith, L. F. Kline, A. C. Gradolph, Minor Corman, A E. Reynolds, H. A. White, T. P. Stahl, J. W. Blaylock, D. B. White, H. B. Dudley, M. H. Croswell C. M. Thompson. S. W. Holmes, H. A. Arth, J. W. Walton, B. A. Ogden, F. Seeley, E. N. Ridley, W. F. Murray, C A. Larson, E. L. Morton, S. A. Mounteer, M. A. Bellion R. W. Siemund, W. T. Jenks, H. P. Schmidt, G. R. Eaton, W. S. Schull and J. E. Hilbish.

LEICH ELECTRIC CO., Genoa. Ill., filled two large rooms with a comprehensive display of telephones and switchboards in actual operation. Frequency converters, harmonic ringing machines, and rectifiers also were demonstrated under actual service conditions together with the company's electrically-restored drop, used in the Leich magneto multiple switchboard. Representatives in attendance were: O. M. Leich, general manager; A. J. Kohn, sales manager; A. C. Reid, engineer; Jno. A. Campbell, Ohio; H. L. Granger, Illinois, and B. L. Parker, Iowa.

LYON METALLIC MFG. CO., Aurora, Ill., by J. E. Bales, R. T. Waters F. H. Duncan, P. F. Arnfield, and D. M. Perriil, advertising manager, exhibited steel lockers, cabinets and shelving of various sizes and styles.

MCLEOD ELECTRICAL SUPPLY CO., Chicago, exhibited various lines, for which they are distributors, including Cameron hangers and cable clamps. Bonito pole-line supplies heaters for drying out cable racks and all kinds of linemen's tools. Pres. C. G. McLeod was in charge.

MONARCH TELEPHONE MFG. CO., Fort Dodge, exhibited its standard telephone and switchboard apparatus, and auxiliary equipment, including four "sold" switchboards on display as follows: No. 42-C, 200-line switchboard, No. 43-D, 320-line, two-position, low-type, switchboard, No. 45-B, 50-line, low-type switchboard and No. 41-C standard stock 120-line, low-type switchboard equipped with 15 double supervisory type cord circuits. One of the boards was set up with a No. 120 arrester frame, and a number of lines connected up for demonstration purposes. The Monarch No. 1 wire chief s test set, equipped with specially calibrated Weston voltmeter also was shown as was the Monarch cordless P. B. X. switchboard. The exhibit was in charge of L. Q. Trumbull, general manager, assisted by A. W. Steinke, chief engineer; R. O. Palmer, sales manager; G. O. Wilson, sales engineer; and C. W. Snyder, H. C. Shear, P. L. Picot, sales representatives.

NATIONAL CARBON CO., Cleveland, O., exhibited Columbia Gray Label telephone batteries and served luscious apples to all visitors. The representatives present were Messrs. Cotabish, C. W. Wilkins, E. F. Meyers, F. J. Kysela, C. M. Clifton, J. F. Harper, R. E. Pulliam, and G. W. Wheatley.

NATIONAL PIPE & CABLE HANGER CO., New York, showed the National pipe cable hanger. John G. Kelly and Jos. B. Heiser were present.

NAUGLE POLE & TIE CO., Chicago, was represented by W. G. Frostenson and A. J. Naugle. Specimens of pole tops and butts, treated and untreated, with photographic views of the company's yards were shown. The machine, for puncturing poles for treatment by the "Pentrex" method, created much interest.

PAGE & HILL CO., Minneapolis, occupied a booth decorated with fresh cedar boughs from one of the Page & Hill cedar camps. The company exhibited section of poles butt-treated by various processes; also, section of the Page & Hill guaranteed penetration process. In attendance were: L. L. Hill, S. G. Harris, and Hart Anderson, Minneapolis; E. C. Stockdale and W. D. Schneider, Chicago; Buford Adams, Kansas City; J. B. Wilkinson, Louisville, Ky., and F. L. Reynolds, Grand Rapids, Mich.

RELIABLE ELECTRIC CO., Chicago, exhibited views of its plant, bouquets of roses and a complete line of telephone specialties, including the A-27 cable terminal, with self-cleaning saw-tooth discharge blocks, the four-point fuse clips and various phone protective devices. A new line of steel building blocks for distributing interior telephone wires attracted much attention. The company also makes wire-splicing sleeves, cable hangers, baby-knife switches, and test connectors. W. L. Cook and G. W. Rodormer received visitors.

JOHN A. ROEBLING'S SONS CO., Trenton, N. J., and Chicago, represented by W. H. Slingluff and others of the Chicago office. Samples were shown of wire and cable for telephone and general electrical construction, include bare and insulated wires, rubber-covered, strand, and all other kinds of wire.

STANDARD UNDERGROUND CABLE. CO., Pittsburgh, Pa., showed rubber covered wire, copper and copper-clad steel, and various types of telephone cable. The Standard company now is building a new mill in St. Louis for all kinds of copper wire and cable for telephone purposes, which will enable the company to serve its western territory much better. E. J. Pietzcker, W. M. Rogers, H. K. Weld, and J. J. Hohmann, of Chicago and J. Lawrence Lyon of the Pittsburgh office greeted callers.

STEWART BROS., Ottawa, Ill., was repwas represented by Ed. and Chris. Stewart, who demonstrated the Stewart test set, as well as the Detectometer test cabinet.

STROMBERG-CARLSON TELEPHONE MFG. CO., Rochester, N. Y., used the entire Gray Room of Hotel Sherman. exhibiting its magneto wall type of telephones; inter-communicating telephones; apartment house telephone systems; No. 104-C cordless P. B. X. switchboards; No. 101 50-line floor-type P. B. X. switchboard; No. 102 100-line floor type P. B. X. switchboard and No. 105 high efficiency magneto switchboard, complete with protectors, cable rack and protector frame. A three-position "Super Service" mulitple switchboard, equipped with the "New Type Keyboard," and a four-frequency duplicate harmonic converter, also was shown. In attendance were: W. R. McCanne, G. A. Scoville, E. A. Reinke, P. Winemiller, R. H. Manson, W. M. Angle, W. T. Eastwood E. A. Hanover, F. K. Cannon, J. S. Gibson, E. G. Eidam, W. T. Powell, S A. Bevland, A. J. Roberts, Kansas City; N. W. Baldwin. Toronto; A. V. Overshiner, Atlanta, Ga.; F. H. Lincoln, Kansas City; and Messrs. C. D. Kinne, M. D. Wood, P. D. Myers G. H. Crandall, J. B' Wilkinson. C. F. Sanders, R. Davis J. A. Berger, E. D. York, B. Richardson, A. B. Crawford, A. P. Preble, C. W. Pointon, J. T. Barrett, J. A. Taggart, C. A. Sweet J. D. Kratz. A. M. Roberts, W. C. Caldwell, and J. P. Galligan.

TEMPLETON,. KENLY & CO., Chicago, showed its line of jacks for pulling and straightening poles; also jacks for telephone companies' trucks and No. 22 cable reel jack. S. A. Nelson, sales engineer, had charge.

THOMPSON-LEVERING CO., Philadelphia, exhibited test sets including the standard T-2000 test set pillar switching dial, Model T-2002 test set—modification of the T-2000 type to meet low price requirements—and for the first time, T-2004, 1922 model, so simplified that anyone can make a test. Other models included the T-2062 improved fault-finding test set, T-2010 Peerless plug-type test set. T-2070 government standard test set (used on warships) and Model T-2005. The Vawter indicating ohmmeter attracted much attention, as did the proportional test set for locating crosses and grounds, the standard artificial cable used in measuring tests, and the wall pattern Vawter indicating ohmmeter. The company was represnted by W. J. Thompson, C. E. Vawter, chief engineer, and J. W. Murphy, Chicago district manager.

TO FINANCE HOMES.

Telephone Workers' Credit Union Form Building Society.

Boston, Mass.—At the sixth annual meeting the Telephone Workers' Credit union, president Charles F. Donahoe announced plans for financing building of homes for members on the partial payment plan.

A considerable saving in the cost of material and labor is contemplated in the operation of the plan.

The assets of the credit union now are more than $300,000, an increase during the past year of 85%, according to President Donahoe.

Palm Beach-Everglades Line to Open in January.

West Palm Beach, Fla.—Barring unforseen difficulties, C. F. McChesney, who is in charge of the Palm-Beach-Everglades Telephone company's line now being constructed, expects to have the line working shortly after the first of the year.

Richmond, Va. Employees Form Telephone Society.

Richmond, Va.—Employees of the Chesepeake and Potomac Telephone company have formed a telephone society and have elected as officers, R. F. Stanley, president, C. S. Perkins, vice president and H. R. Sutton, secretary-treasurer.

Frank Builta Advanced in Bell Northwestern Organization.

Omaha, Neb.—Frank C. Builta, in charge of the advertising and publicity of the Northwestern Bell Telephone company has been made assistant to the president of the company. He will continue to direct the company's advertising.

OPINIONS AND COMMENTS

THE PEAK LOAD.

Not every utility or private business can care for such enormous peak loads or handle them nearly so well as does the telepphone industry. Street car traffic jams in the rush hours of morning and evening we have with us always in the cities, but they are not in it with telephone traffic on the nights of close and exciting elections. In Boston alone during a recent election the connections for the day totalled 1,500,000, requiring the services of 2,000 operators, Even heavier traffic is recorded in New York, Chicago and Philadelphia during important elections. A tremendous burden also is placed on operators at Washington, which is naturally the centre of interest during the closing hours of a campaign. Even in the smaller cities and villages and on rural lines there is a huge increase in telephone traffic on election night. To meet such problems in the large cities a careful study is made of traffic records for previous years, of current data as to number of subscribers, and even of the issues involved in the election. With this information provision is made for extra operators, and arrangements made for special luncheon service so that the strain on the force may be reduced to a minimum. Often additional switchboard positions must be installed and many special wires are run for theaters, clubs, newspapers, etc. Yes, indeed, the telephone business has its peak loads, daily as well as the greater special ones, but it handles them more cheerfully and more rapidly than any other business you know.

IT PAYS TO READ

In business, it pays to watch your contemporaries and competitors. No individual or concern has a monopoly of brains and methods. Find out what the other fellows are doing—and go them one better. Read the magazines of your business.

PHONE FINANCING.

Subscriptions for the New York Telephone company's bond issue were more than nine times the amount of the $50,000,000 issue offered, according to the announcement of J. P. Morgan and company.

Although scarcity of good bond offerings undoubtedly figured in this great over-subscription, the substantial endorsement of the nature of the issue is not to be denied.

Studious investors know that securities in a good telephone company are as solid as the Rock of Gibraltar.

And—speaking of the Rock of Gibraltar, which always brings to mind the Prudential Insurance company—did you notice the insurance company advertisement in which it told how its funds were invested in public utility companies? It was a good testimonial for utility securities.

With the condition of security markets at present very favorable to telephone company issues, the industry is invited to an unprecedented expansion during 1922.

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NEIGHBORS.

In Concord, N. H., there has been staged a very pleasant aftermath of the successful Telephone Week conducted by New England telephone companies.

It will be recalled that the telephone company held open house, and entertained subscribers in the exchanges, conducting educational inspection tours.

A certain John B. Abbot, head of one of Concord's industrial institutions, returned the telephone company's compliment and invited the phone force to his factory for a visit of inspection. As many of the force as could be spared accepted the invitation.

Here is a splendid example of a neighborly spirit in industry. This case in Concord is an indication of the new era in business; one in which mutual understanding and the personal equation is going to make things a lot happier and more profitable for us all.

PLAN A WEEK.

Credit is due the New England Telephone and Telegraph Company for opening the eyes of the industry to the possibilities of "Telephone Week."

This event made warm friends for the company of thousands who probably had the organization classed as a typical "soulless corporation."

There never was another activity in the telephone industry that compared with the New England "Telephone Week" in the volume of publicity granted by the newspapers.

Get busy with this "Telephone Week" idea. It is a sure winner!

MERRY CHRISTMAS.

Just because it's Christmas is excuse enough to forget trouble and wish good to all men. Telephone folks are friends of Santa Claus. If they didn't believe in him, a lot would have given up long ago. So, welcome, St. Nick. You'll find some empty stockings yet to fill in this field.

The First Rebels

Chicago, Ill.—No mention can be made of the Independent telephone movement in America without bringing to mind the pioneers of pioneers in that declaration of independence which revolutionized the telephone business of the country and gave to the industry that impetus of competition without which there can be no progress.

Eugene L. Brown of Chicago has well earned the title of leader of the pioneers in that first break against Telephone monopoly. With him, upholding the commercial end, was P. C. Burns, who has from that time been one of the leaders in the manufacture of telephone equipment.

Mr. Brown has since remained closely in touch with the independent interests, and is now associated in the manufacturing branch with Mr. Burns, as secretary of the American Electric company. To enumerate more fully their connection with the early start of this revolution in the telephone industry we quote from an article on the subject by Paul Latzke, which appeared in the April, 1906, issue of "Success:"

"For romantic interest there is, probably, no chapter in our industrial history to compare with the one describing the birth and growth of the independent telephone movement. Here is a business that, today, represents, conservatively, three hundred millions of capital. It employs over 100,000 workers, and has more than 300,000 stockholders. It has revolutionized the telephone business of the country and effected a saving of hundreds of millions for the public.

"Yet a few years ago it had no existence. It came in the most humble way out of the most obscure places. It had to fight its way, step by step, against the most powerful opposition ever offered on the industrial battlefield. The courts, politics, the public press, and millions of money have been used for its undoing.

"It represents the crystallization on a commercial basis of a people's protest against extortion and unfair treatment. It embodies in business the spirit of American independence. Take, as an illustration, the organization of the first active and successful independent operating company in the present movement of which we have any record, the one at Noblesville, Indiana."

The story of the telephone monopoly throughout the country at that time is undoubtedly familiar to the reader. The situation was deplorable, the spirit of public resentment was strong, and had grown particularly pronounced in Indiana. To quote Mr. Latzke further:

"Telephone subscribers in general, while complaining bitterly of their treatment, still accepted the monopoly as a matter of course and believed that it must probably continue forever. There were two men in that state, however, who believed otherwise and prepared themselves accordingly. Both were destined to play important roles in the great independent movement that later swept the country.

F. L. Brown.

"One of these men was P. C. Burns, at that time located at Kokomo, where he was engaged in a small way as a manufacturer of batteries. Some years before he had been active in the telephone business, making apparatus in St. Louis for the opposition companies that had sprung up in the early days of the Bell patent. When the United States supreme court decision sustaining Prof. Bell's exclusive claim put these companies out of existence in 1887, Mr. Burns's business, of course, was destroyed but he made up his mind to go back into the field again at the first opportunity, and in January, 1893, he made the plunge. This was two months before the fundamental Bell patent expired, but Mr. Burns inured to fighting the trust waded in nevertheless. He sent circulars broadcast offering to supply in any quantity "telephones exactly like those used by the Bell company." These circulars went to business concerns throughout the country. One of them sent to the Citizens' Bank of Noblesville, fell on fruitful ground for it reached the hands of that other man in Indiana who had been preparing. This was E. L. Brown, the leading druggist of the place.

Years before, while living in Pennsylvania, Brown had asked to have a telephone line installed between his home and the nearest railroad station. The Bell people offered to rent him two telephones at $100.00 a year and let him build his own line. This led him to investigate the cost of making telephones and opened his eyes to the outrageous prices asked by the trust. It aroused his determination."

"He would go into the business in opposition as soon as the expiration of the Bell patents should permit. Afterwards, when he had settled at Noblesville, the troubles of his neighbors and himself with the telephone service there strengthened his determination, and he waited only an opportunity to put his plans into effect. The favorable moment came just before the Burns circulars were sent out. Brown was busy behind his prescription counter one day when Albert Church, the cashier of the Citizens' bank, came into the place in a raging frame of mind. Without giving the druggist a chance to ask a question Church 'opened up' on the telephone company."

"What have they been doing now?" asked Brown, sympathetically, when he could get in a word."

"Oh the same old story—no service when you want it most—a breakdown somewhere—only this time it hurts worse than usual. I've lost a deal that meant hundreds, because the thing went bad, and then on top of that I got the regular dose from the manager."

"Could take the thing out if you didn't like the service?" suggested Brown."

"Yep, cut me off when I threatened to sue 'em, and told me they weren't guaranteeing service and I could sue till blue blazes. Say, but I'd go to the infernal regions to get even," Church ended savagely.

"You needn't do that," Brown put in suavely; "I'll show you an easier way."

"How?"

"Start an opposition telephone company."

"Me? What do I know about the business? I'm a banker not a lineman."

"Not you, Albert, but we. We'll start a company if you'll help us out."

"And they did, Brown and Church, and a number of other solid men of the town.

"They were, or course, badly hampered. They had no experience, no technical knowledge. The only man in the combination who knew anything at all of telephone apparatus was Brown, and his knowledge was purely theoretic. Worse still they could get no apparatus. Brown traveled all over the country trying to induce manufacturers of electric appliances to make them telephones and switchboards, but without success. The manufacturers were all afraid of the Bell patents, and had before them a knowledge of the things that usually happened to infringers of those patents.

"When the promoters had become almost discouraged, the Burns circular came along. Brown went to Kokomo, and in a few hours he had completed a contract for the necessary telephones. There was still, however, the question of the switchboard. The Bell Company had that part of the telephone machinery so thoroughly covered with patents which still had long terms to run that it seemed almost hopeless to try to get around them. Finally even this difficulty was solved by the construction of a switchboard that reverted to the simple type used by the district telegraph companies. When these matters were adjusted the Noblesville people began to solicit subscribers, and in the late fall they started with seventy-five telephones installed, something hitherto unheard of in a town of that size. The first year they cleared thirty per cent on their capital of $10,000.00 (notwithstanding they had cut the Bell rates in half) and the independent movement of Indiana and of the country was started on its course.

"Not long afterwards active telephone opposition manifested itself in other sections. Almost always these opposition companies came out of just such circumstances as those that had brought the Noblesville company into being."

Mr. Brown did not end his task with the endeavors at Noblesville, but threw himself heartily into the work, and rapidly spread the spirit of revolt. The next scene was laid at Lebanon, Indiana, then followed Bluffton and Tipton. From Indiana he moved his battlefield to southwestern Missouri, Joplin, Carthage, Webb city, and adjoining territory, where the independents soon gained a strong foothold—then to eastern and central Ohio, and on all through western Pennsylvania, where a particularly noteworthy victory was won at Butler—then further east and wherever public spirited citizens indicated a desire for reform and advancement.

"New companies in Illinois, Ohio, Wisconsin, Iowa, Minnesota, and other middle western states all had the same troubles that were experienced in Noblesville in the matter of apparatus, and naturally their service was crude and generally unsatisfactory. Notwithstanding this, however, these little companies were invariably successful, and in most instances they practically put the Bell people out of business wherever they started in opposition. The public rallied to the support of the independents who were their friends and neighbors, and cheerfully put up with a poorer quality of service. Men came out of all walks of life to promote and manage these new companies. They were butchers and bakers, doctors and lawyers, clerks and mechanics, small business men, railroad men, farmers, men, in fact, from every station in life. Very few of them knew anything of the telephone business except such facts as they could pick up by painful experience."

"It was into such an uncharted industrial sea that the independent telephone pioneers plunged. That they should have been able to keep from foundering is extraordinary. That they have finally succeeded, not alone in making harbor, but also in putting their great rival out of port in so many places is one of the wonders of the industrial world. There is only one explanation of the phenomenon. The people were behind the movement. The spirit of popular protest that was organized in Noblesville was in existence throughout the country and pushed the independents over the roughest places."

It has taken the determination and energy of such fearless pioneers as Eugene L. Brown and P. C. Burns to start this movement along practical lines. It is to such pioneers that we can give credit for the fact that our country ranks foremost in the development of the telephone service.

Pomona, California, Company Continues Successful Career.

Pomona, Cal.—According to manager Carl H. Lorbeer, the Pomona Telegraph and Telephone union is looking forward to 1922 as the greatest year in its history. The first of five new switchboards recently ordered already is enroute. Considerable line construction work is to be done. During 1920 and 1921 the company will have added more than 1,000 subscribers.

BELL BUSINESS BOOMS.

Demand, Service and Earnings All Show Improvement.

Total revenues of the parent A. T. & T. Co. for the first nine months of 1921 exceeded those for the corresponding time last year by $4,108,802, or about 6 per cent. The capital stock now outstanding amounts to $532,988,024. Earnings applicable to dividends for the first nine months were $40,787,612, equivalent to $7.65 a share. Earnings on the actual average amount of stock outstanding during the period were $8.69 a share, or at the annual rate of $11.61. There has been no abatement of requests for telephone service, and notwithstanding installations at more than the normal rate, unfilled applications are still largely in excess of normal.

President H. B. Thayer says that, taking 70 as average good the country over, telephone service which had sunk as low as 50 last year now is nearly 90, the best average the A. T. & T. Co. ever has enjoyed. "We knew and admitted our service was bad last year," said Mr. Thayer, "an outgrowth of war conditions, but we know now that the nation is getting the best service it ever had. When one considers that the New York City average service got as low as 20 early last year and now is around 90, it can be seen that the hard work we devoted to improving matters has borne fruit."

Mitchell Telephone Co. Formed at Sebring, Fla.

Sebring, Fla.—Headed by L. L. Morgan, and with George V. Russell, vice president, and W. B. Mitchell, secretary-treasurer, the Mitchell Telephone company has been organized to operate here.

Versailles, Ill., Company Is Incorporated.

Versailles, Ill.—A state charter has been granted the Versailles Telephone company. Incorporators are: Ralph Reid, F. S. Morgan, Allen Thurman, E. C. Bates, and J. H. Robinson.

Boll Weevil Losses Bring Rate Cut Voluntarily.

Stonewall, Okla.—To share the burden of the boll wevil ravages the Stonewall Telephone company, W. H. Letter, manager, has secured the O. K. of the state corporation commission on a voluntary reduction.

SHOOTS STRAIGHT!

Lynchburg, Va., Subscribers Get the Real Facts on Rate Needs in Ad.

Lynchburg, Va.—A classic in rate case advertising has been run in Lynchburg newspapers by the Chesapeake and Potomac Telephone company of Virginia. This advertisement, an excerpt from the company's petition to the council, tells the tale without any fancy trimmings and in a most convincing manner. It says:

"In order to fulfill our obligation to our patrons in Lynchburg, we will have expended during the current calendar year about $100,000 in extensions to our plant, thus making it possible to supply service in any part of the city upon immediate notice. We have also by diligent effort brought the quality of our service up to a standard never heretofore reached.

"The rates now being charged place no burden upon the subscribers. This was evidenced by the fact that when these rates were introduced, few, if any, of our subscribers relinquished their service by reason of the increase, and in spite of the handicap of depressed industrial conditions the number of our subscribers at Lynchburg is constantly increasing.

"The existing rates produce a very moderate rate of return, namely, 6.21 per cent, on the investment in the plant used in the service; a rate of return even now lower than is sufficient to attract investors, and a return to the rates in effect before the amendment was adopted would reduce our net return to but 3.31 per cent on the investment.

"The additional cost of the present rates per subscriber is only 50¢ per month, and we believe that our Lynchburg patrons are more interested in securing a good, dependable telephone service than they are in the small sum which would be saved by a return to the former rates.

"We earnestly desire to maintain at Lynchburg, an up-to-date, adequate plant, furnishing service of the highest quality. We have no desire to earn excessive profits. We only ask that we shall be permitted to maintain rates which will yield a sufficient sum of money to attract investors, in order that we may continue to expand and meet satisfactorily the requirements of our patrons."

A Corner of the Cook Exhibit, Where Wireless Grand Opera Was Heard During Chicago Convention.

Frank Woodruff Gets Glad Hand In His Old Home Town.

Charleston, S. C. — Frank Woodruff, general commercial manager of the Southern Bell Telephone company dropped in recently on company business. His return to the old homestead was noted in the local newspapers, one of which said, "Mr. Woodruff was manager at Charleston about fifteen years ago, and it is a matter of record that he made a success of his work, being always on the alert to improve the service rendered by his company. He left Charleston on promotion and has been receiving his promotions steadily ever since. Friends are delighted to welcome Mr. Woodruff back to Charleston and regret that his stay is limited."

Notable Progress in Pole Preservative Treatment.

Chicago, Ill.—The most notable progress yet recorded in the preservative treatment of poles to prevent decay was made in 1920, according to a report recently issued by the Service Bureau of the American Wood Preservers' association. The number of poles treated in 1920 was 585,781, or about 75 per cent more than were subjected to treatment in any previous year. These figures cover only those poles treated with equipment maintained at pressure and open-tank treating plants. Principal pole species treated were southern yellow pine and western red and northern white cedar. The southern pine poles were treated the entire length by pressure by the standard Bethell, Lowry, and Rueping processes, while the cedar poles were given a butt treatment by the open-tank process. To insure satisfaction a good preservative should be used, and a penetration sufficient to prevent the entrance of decay should be obtained. The 112 active pressure wood-preserving plants scattered throughout the country used in 1920 50 million pounds of zinc chloride and 69 million gallons of creosote oil for the treatment of over two billion board feet of timber. Decay, which can be prevented by proper preservative treatment, destroys more wood annually than any other agent. The desire for permanence at low cost is given as the reason for the increased demand for well-treated timber.

W. E. Makes Changes in Branch Personel.

New York City—The Western Electric Co. announces the following changes in executive departments of six of its distributing offices: A. V. Willett made Credit Manager at Chicago; A. L. Perry Manager at Omaha; A. Mason Manager Supply Branch Store at New Haven; E. R. Morgan Stores Manager at Baltimore; A. W. Bates Stores Manager at Detroit; H. L. Nash Manager of Telephone Distributing House at New Haven; R. L. Colfax Stores Manager in charge of Telephone Distributing House at Pittsburgh.

English "Electrician" Passes Sixtieth Milestone.

London, Eng. — On November 9th, the Electrician entered its 61st year. The publication is acknowledged one of the leaders of British trade journalism and is an active factor in English electrical progress. The Electrician's

PRIZE HEROINE.

Mrs. Mildred Lathrop Awarded Premier Vail Honor for 1920.

Homer, Neb.—Mrs. Mildred Lathrop, chief operator for the Northwestern Bell at this point, has been awarded the $1,000 and gold medal given as the principal prize for devotion to duty.

In a brief story of what she did to deserve first honors, is the following statement:

"To Mrs. Lathrop's sense of fidelity to duty and to her heroism in performing that duty at the risk of her life, has been directly traced the saving of the lives of more than 100 people whom she warned when the village of Homer, Neb., was inundated by the rising of the Omaha Creek on the night of May 31, 1920, due to a cloudburst."

She is the chief operator, Northwestern Bell Telephone company, at Homer, and to give warning Mrs. Lathrop, who had been awakened at 2 a. m. by a call from a farm several miles up the creek, sat lightly glad at her switchboard until the rushing water covered the floor of the little office and mounting slowly washed over the shelf of the switchboard, waist high putting the wires out of service. She refused to leave her post, although her son, with tears in his eyes, implored her to think of her own safety, and also turned a deaf ear to others who urged her to get out before the building was carried away.

Mrs. Lathrop, who is the mother of five sons, two of whom served overseas during the war, was forced to wade through water up to her breast to reach a place of safety in a building across the street.

Chicago Hits 600,000 Mark in Telephones

Chicago, Ill.—Within the corporate limits of the city of Chicago, there are now 600,000 telephones. This announcement was made by the Illinois Bell Telephone Company, which completed the job of installing telephone number 600,000 in a North side business office. The following list shows the growth of the telephone system in Chicago.

1905	100,000
1909	200,000
1912	300,000
1915	400,000
1918	500,000
1921	600,000

There are more than 1,000,000 Telephones in the whole Illinois Bell.

POST-WAR RECORD.

Heavy Over - Subscription to N. Y. Telephone Company Bonds Significant.

New York City.—With subscriptions totalling almost 10 times the amount of the $50,000,000 issue of the New York Telephone company's 20 year bonds allotments have been made on approximately the following scale: $500,000 and over, 5 per cent.; 10 per cent. on $100,000 and up to $500,000; 20 per cent. on $75,000 and up to $100,000; 25 per cent. on $25,000 and up to $50,000; 30 per cent. on $25,000 down to the $1,000 bonds, which will be alloted in full.

The total subscriptions are the largest which have been made on an industrial issue since the close of the war. One single subscribing institution sent in an application for one-half of the total.

Coggeshall & Hicks announced that their offering of $220,000 Peninsular Telephone Company first mortgage 6 per cent. sinking fund gold bonds, has been sold.

Fire Costs Hillsdale, Mich., $7,000.

Hilldale, Mich.—Crossed wires are suspected as the cause of a fire in the local exchange which resulted in a $7,000 loss.

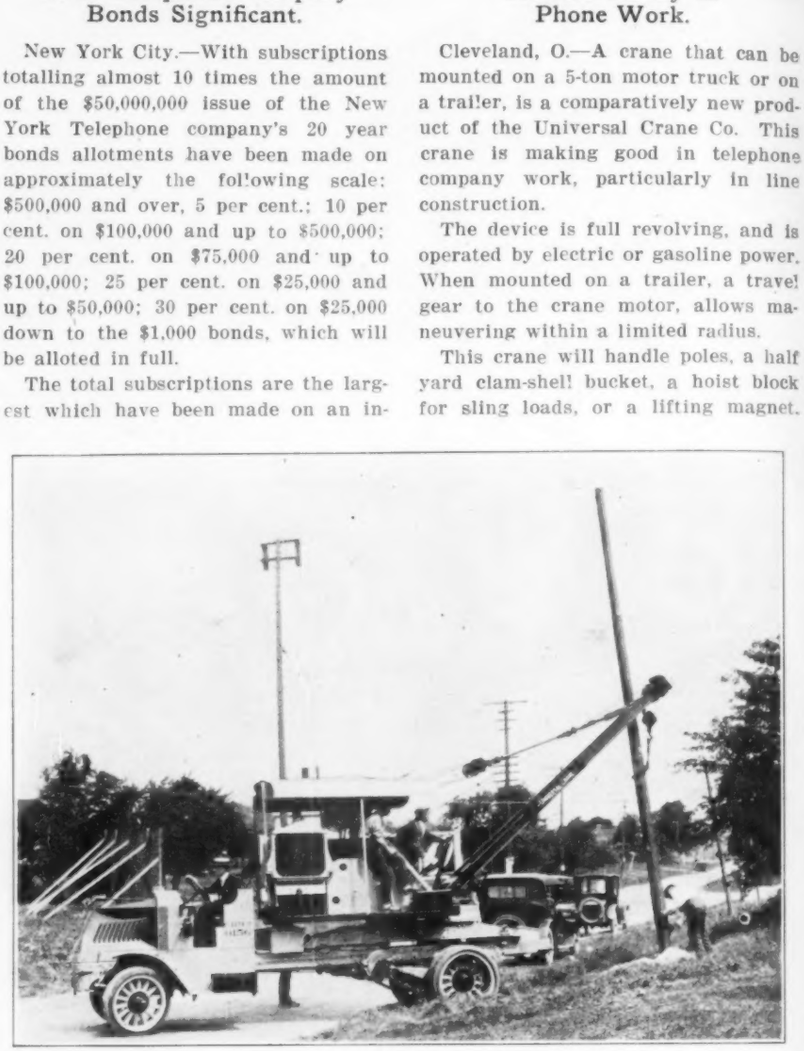
TRUCK CRANE.

Portable Device for Trucks and Trailers Handy in Phone Work.

Cleveland, O.—A crane that can be mounted on a 5-ton motor truck or on a trailer, is a comparatively new product of the Universal Crane Co. This crane is making good in telephone company work, particularly in line construction.

The device is full revolving, and is operated by electric or gasoline power. When mounted on a trailer, a travel gear to the crane motor, allows maneuvering within a limited radius.

This crane will handle poles, a half yard clam-shell bucket, a hoist block for sling loads, or a lifting magnet.



Truck Crane Makes Easy Matter of Handling 1000 lb. Pole.

Other equipment such as a drag-line bucket, pile driver attachment, capstan, etc., will be furnished when desired. An intelligent laborer can operate the crane, it is said.

After two years' service under actual working conditions, the crane has proved its fitness to the extent that its makers are planning to push it vigorously in the industrial field.

Milwaukee Alarm Chief Proposes Municipal Phone System.

Milwaukee, Wis.—Milwaukee is to have its own telephone system for city departments if the proposal of Oscar Kleinstuber, superintendent of the fire and police fire alarm system, is adopted. He estimates cost of new work requires as $3,000.

SELLS ITSELF.

Stromberg-Carlson Pulls Novel Stunt at Illinois Convention.

Springfield, Ill.—Let talking equipment talk about its own merits was the idea Stromberg-Carlson put across at the Illinois Independent convention by using a loud speaking receiver mounted in the front panel of the 105 switchboard. In this way the merits of the apparatus; automatic restored ring-off signals, non-ring through cord circuits and plug restore drops were called to the attention of visitors.

Other equipment displayed by Stromberg-Carlson was the No. 101 P. B. X. switchboard in operation, various types of central energy telephones, magneto telephones, inter-communicating telephones, a large display of line construction materials together with numerous samples of Stromberg-Carlson switchboard apparatus.

The Stromberg-Carlson Telephone Manufacturing company was represented by E. F. Barker, A. J. Johnson, and P. D. Meyers.

Michigan Merger Figure Set at $1,250,000.

Lansing, Mich.—A price of $1,250,000 has been agreed upon as the consideration in the deal by which the Michigan State Telephone company is to buy the Valley Home Telephone company's properties in the Saginaw Valley. The two systems will be combined and duplication of telephone service in Saginaw, Bay City and the surrounding towns will be eliminated. Rates for the consolidated service will be fixed by the public utilities commission after the sale and merger. It is understood that the two companies will go before the telephone users of the territory effected, especially before the chambers of commerce and other organizations of business men, to try to obtain approval of a proposed schedule of rates for the single service before the final transfer of property takes place. The Michigan State originally asked rates amounting to from 65 to 90 per cent above the present rates of each of the competing companies. It is understood that it has receded from this demand, and is now willing to purchase the Valley Home properties if it is able to obtain a small advance over the rates charged by each exchange at present.

Zap, N. D., System Now Owned by Otto W. Mueller.

Zap, N. D.—Otto W. Mueller, of Stanton has purchased the Zap telephone exchange from a number of farmers and plans to improve the equipment and service of the plant.

Thompson-Levering Has New "Simplicity" Test Set.

Philadelphia, Pa. — Peerless testing set line manufactured by the Thompson-Levering Co. has been increased by the "Simplicity" test set which operates on an entirely different principle from the old and almost universally adopted bridge type. In perfecting this new set it was imperative that it operate on a different principle from the bridge set as the latter type possesses all the advantages attainable in the various Peerless sets of this company. The perfecting of their "Vawter Indicating Ohmmeter" system rendered possible the reading of resistances directly, without ratio arms, on a rheostat provided to read from .01 ohms to 10,000 ohms. The system is a two coil, magnetically controlled, system of very high magnetic torque and is so designed as to respond to changes of resistances of less than 1/10%, and to have its index occupy, invariably, a certain definite position of balance, marked 0, when equal resistances are inserted in a divided circuit of two branches from a battery, or any source of direct current, the branches containing in each, one of the moving coils that oppose each others rotation. When measuring any resistance, as a loop or single wire thru ground, the rheostat is in one branch and the loop in the other and when balanced the reading of rheostat is resistance of loop. When locating a ground (the same applies to a cross) the bad wire and rheostat are in one branch and the good wire in the other and when balanced the resistance of bad section and rheostat are equal to that of good section. These two readings give the most simple and yet universal method of locating all grounds and crosses from 1 to 10,000 ohms from instrument by simply subtracting the two readings of rheastat and dividing by two. Variations of current from battery whether due to varying ground resistance or different battery voltages do not affect the indications of index in any position, that is the index remains in one position when current varies and only changes this position for changes in resistance of the rheostat or of the loop or portion of loop—but not for resistances of fault. There is only one precaution to observe. It is to be noted that the movement of index becomes more and more sluggish with increased fault resistance and sufficient voltage must be employed to give the index a perceptible motion. A perceptible motion of index is all that is required for accurate results.

Thompson-Levering's New Test Set.

Opens and inductive crosses are located by aid of a special patented attachment that gives an alternating current in the external circuit connected to the line posts but leaves the current direct in all parts of the internal system thus enabling the direct current operated ohmmeter system to be balanced by aid of the rheostat just as for locating grounds and crosses. Engineers who examined this set at the Chicago telephone convention and noted its operation under tests representing actual field conditions, declared it marked a distinct advance in cable testing, simplifying operations and calculations, and enabling testers to obtain reliable results, impossible with any other set. Complete information and prices can be obtained of the Thompson-Levering Co. at their new plant, 57th St. and Westminster Ave., Philadelphia, Pa.

"BEG YOUR PARDON."

In the November issue of TELEPHONE ENGINEER invention of the Wheatstone type of substation circuit was credited to W. W. Dean.

The invention, we are informed, was made by Ray H. Manson, and patent No. 818,897 covering this circuit was granted him on April 24, 1906. Subsequently this patent was reissued as No. 12909, granted March 23, 1906 to Mr. Manson. The patent and its reissue were originally assigned to the Dean Electric company, and now are owned by the Stromberg-Carlson Telephone Manufacturing company.

TELEPHONE ENGINEER, acknowledges, with thanks, the information which enables us to make this correction.

United in Illinois

Memorable Meeting at Springfield Results in the Getting Together of Bell and Independent Telephone Men Nov. 8-10

As stated briefly, last issue, the Bell and Independent telephone men of Illinois united in one association at Springfield, November 8–10. The occasion was the last meeting of the Illinois Independent Telephone Association which has dropped the word "Independent" from its title, has changed its by-laws and henceforth will admit Bell Telephone men to membership. The action of the Illinois organization has set a precedent which bids fair to be generally followed by the Independent organizations everywhere. Another feature of the Springfield meeting was the report of Jay G. Mitchell, the associations secretary-treasurer who has proved himself a big man

Peculiar Trials of Telephone Industry.

Mr. Mitchell referred to the trials which the telephone business has suffered during and since the war and showed the importance of permanently better rates. Its intimate association with commercial, financial and industrial conditions subject the telephone industry to sharp fluctuations which must be covered by the fixed rates of revenue. While business conditions in general are improving, as shown by the fact that long distance telephone traffic again approximates normal. Mr. Mitchell said it would require some years of good business at increased rates to enable telephone companies to recoup their losses and to make the improvements and extensions they have had to forego for so long that the public is becoming irritated. Unfortunately, this same ignorant and unreasoning public, which has been educated to pay from 100 per cent to 500 per cent more for various commodities than it paid before the war, does not understand conditions in the telephone and other public utility industries. Not being informed, the public demands a reduction of public utility rates. To meet this situation, the Illinois association is giving the greatest possible publicity to the telephone business and is endeavoring to show people why reductions in present rates in certain cases and denials of increased rates in other cases are wrong, and against the public's welfare. Mr. Mitchell reported that the Interstate Commerce Commission, conforming to the Esch-Cummings law, now is endeavoring to determine the rates of depreciation applicable to common carriers, including telephone companies. The Illinois association, by direction of its board of directors, has filed a statement with the Interstate Commerce Commission making recommendations as to the methods to be employed in fixing the amount that must be provided from revenue to cover depreciation of plant and equipment in telephone properties.

Make Your Cases Strong.

The present laws and the present Illinois Commission have been found satisfactory in the main, Mr. Mitchell said, although the commission needs help — more employees to handle promptly the enormous volume of business presented for action. Under such conditions it becomes urgent that all cases be carefully worked up in advance of their presentation to the commission. Always, the company should remember that the commissioners are confronted with a public clamor for reduction of rates, the public suffering from the delusion that public utilities are tremendously and unreasonably profitable. Referring to the plight of many rural telephone companies, Mr. Mitchell declared it essential that a working basis be formulated at once for the extension of electric light and power systems without hampering the country telephone service. He pointed out that rates for rural telephone service are low, the service admittedly of inferior grade prospects remote, under present conditions, for securing the necessary capital and public support needed for improvement in the type of circuit or grade of service employed for rural communities in the past.

Officers and Directors Elected.

During the past year, the Illinois association held ten very successful district conventions and operators schools. The association is represented on the Illinois Committee of Public Utility Information. It has supplied speakers, in many cases, for civic bodies and is arranging to cooperate with the Illinois Public Service Speakers' Bureau in the coming year. For the third successive year, Dr. R. E. Gordon, of El Paso, was elected president of the association, E. S. Sterrett, of Henry, and Jay G. Mitchell, of Springfield, being re-elected vice-president and secretary-treasurer, respectively. The directors chosen are: A. R. Bone, H. G. Lankford, Dr. R. E. Gordon, B. M. Burke, H. H. Knipe, A. R. Patterson, T. C. Ainsworth, A. B. Minton, W. H. Bassett, Dr. J. H. Schwarz, E. S. Sterrett, G. X. Cannon, E. D. Glandon, Dr. W. C. Lumpkin and Fred. Norris.

Dr. Gordon recommended that telephone men cogitate the following items for the benefit of themselves and their public:

Service, good or bad, must be furnished by a utility; the cause of good service is good equipment and perfect understanding between the utility and the public; the cause of bad service is poor equipment and lack of understanding between the utility and the public; some of the causes are beyond our control; most of them are within our control; such as good will, readiness to serve, public education of the requirements of the business, and more considerate subscribers; good will, by far the most important, is under our control; study the law of averages and apply the Golden Rule; if we develop the proper attitude, the subscriber can't help following.

Other Features in Brief.

Among other features of the Illinois meeting were a talk on Phantom Circuits by Prof. Achatz, of Purdue University, M. G. Lloyd's address on Hazards of Overhead Construction and How to Meet Them and A. R. Bone's paper on Satisfactory Contact with the Public. Mr. Bone is General Commercial Superintendent of the Illinois Bell Telephone Co. at Chicago. John F. Gilchrist, vice-president of the Commonwealth Edison Co., Chicago, also spoke on Public Relations and the Consumer's Market, and David F. Hall, Division Attorney of the American Telephone and Telegraph Co. at Chicago, covered Interference to Telephone Service by Induction. Prof. King of the University of Illinois discussed Preservation of Poles and Cross Arms, and E. C. Blomeyer, general sales manager of the Automatic Electric Co. hit everybody right with his talk on Important Factors. Pres. MacKinnon, of the National Association, also was there with one of his inspiring addresses.

W. S. Vivian, of the Automatic Electric Co., Chicago, conducted one of his highly successful operators schools.

NEWS FROM FOREIGN LINES

CANADA'S EARLY DAYS.

Hamilton, Ont., Place, 1877, Time of Beginning of Canadian Telephone Service.

Vancouver, B. C.—R. B. Bennett, who edits the interesting house organ Telephone Talk, for the British Columbia Telephone company is authority for the statement that the earliest commercial telephone line in Canada was undoubtedly the one equipped with six telephones and first tested on August 29, 1877. This line was built in Hamilton, Ontario, and employed only a single wire, using the ground for the return circuit. It is quite probable that this was the first occasion where more than two telephones had ever been used on one circuit. The successful operation of this line led to the opening at Hamilton of the first telephone exchange in Canada, and the third in the world.

At about this same time, attempts were made to talk simultaneously on two circuits from Hamilton to Dundas—five miles distant—when the interference between the two conversations was very troublesome, and the inventor of the telephone was appealed to for help. He recommended that each insulator on the line should have a zinc thimble between it and the crossarm. This was tried, but without any improvement, and this interference, or "cross-talk," as it is now called, was not overcome until each of the single wire circuits was made "metallic" by stringing a second wire for each circuit and eliminating the ground return.

On September 29, 1877, the first successful conversation over any considerable distance was carried on between Montreal and Quebec. This was the record conversation at that time.

From this very meagre beginning Canada's telephone systems have grown until, today, the wire mileage exceeds two million miles and there are more than two thousand companies operating seven hundred and fifty thousand telephones. There are 12.2 persons per telephone and 4.5 persons per mile of wire.

Australia's Big Cities Cramped by Phone Shortage.

Sydney, Australia.—Australia's large cities are experiencing a severe shortage of telephones, writes U. S. Trade Commissioner A. W. Ferrin. About August 1, more than 4,000 instruments were lacking in Sydney alone. A shipment of 1,000 relieved the situation to but a limited extent, as a scarcity of other materials prevented the installation of most of the telephones. Six switchboards, ordered in August, 1920, were still undelivered in August, 1921; and of 60,000 telephones ordered at the same time only 9,000 had been received, while of the 138,000 instruments ordered since August, 1920, only about 3,000 had arrived in Australia a year later. It is stated that material valued at over £1,000,000 is outstanding.

France to Have Wireless Phone News Service.

Paris, France.—Wireless telephone news messages are to be sent soon from a sending station in the Eiffel tower according to plans recently announced. Private organizations, such as newspapers and banks are to have receiving apparatus. Europe is getting a strong play on wireless telephony for commercial purposes. Service between London and Holland is to be inaugurated. These plans have been delayed by absence of permit from British postal authorities, and more recently, by the destruction of the masts and equipment by a windstorm which struck The Hague.

Ants Banquet on Underground Cable in Australia.

Melbourne, Australia.—A tale comes from New South Wales which goes to show that the telephone man can expect trouble from every source and never be disappointed. Following heavy rains 59 telephones were out of service. Investigation showed the cause of trouble to be white ants. The ants were found among the wires in an underground cable. They had eaten through a heavy lead sheath, a timber wrapping which had been treated with arsenic and tar, paraffin, and paper.

COUNTRY'S ESSENTIAL.

Czecho-Slovak Builds Telephone System in Two Years From Nothing.

London, England.—An indication of the telephone's vital importance in national life is apparent in the growth of the Czecho-Slovakian telephone system. According to the Electrical Review in less than two years the Republic has increased its telephone lines by no less than 6,250 miles.

At the moment of the proclamation of Czecho-Slovak independence in October, 1918, there did not exist in the whole country even six miles' length of copper wire with which to start new constructions, and yet, since then, the Republic has constructed new telephone lines equivalent to all that was constructed by Austria-Hungary through several decades. This is a noteworthy achievement, especially when one considers the difficulties under which the Republic has laboured, the scarcity of material, the enormous cost of the same and of labour, to say nothing of the necessary financial means.

How necessary it was to take energetic steps in this matter may be judged from the fact that between Prague and Brno there was only a single line, while the west of the Republic, Bohemia and Moravia was not directly connected at all by telephone with the east, with Slovakia. This state of affairs was the result of the Austrian policy of centralization, which demanded that all roads should lead to Vienna or Budapest.

Today there exists direct communication between Prague and all the principal towns of the Republic, and also between the latter, one with another. Further, direct communication has been established with Austria and Germany, with Jugoslavia (Lublin), Laibach (Agram), Trieste, and with Hungary (Bratislava (Presburg) to Budapest). Negotiations are proceeding for communication with Poland and with Switzerland. The Czecho-Slovak Telephone Administration is constructing a new line to connect Prague with Nuremburg, and this line will also serve for communication with Switzerland and France.

MOURNS "UNKNOWN."

Long Distance - Loud Speaker Service Brings Arlington to 100,000 Ears.

Washington, D. C.—President Harding's tribute at the bier of the Unknown Hero at Arlington Armistice Day was heard by 50,000 people in New York, Chicago, San Francisco and other large cities.

The event was the first simultaneous national test of the loud speaker developed by the Bell staff, and its performance made possible deeply impressive ceremonies throughout the country.

But five of the Loud Speakers have so far been constructed, and it will be some time before they will be available for any but special occasions, since the present cost is very nearly $12,000 each. Undoubtedly further experimenting will result in discovering simpler and less expensive methods of construction, and then the full value of the apparatus will be appreciated as a means of enabling a speaker to address vast numbers without exertion and with the certainty of holding the attention of every one present, which, with the unaided human voice, would be an impossibility.

Imagine; Boyd's Been Around For 24 Years!

Chicago, Ill.—It is hard to believe that C. D. Boyd, the Automatic Electric Co.'s handsome blonde representative, is a Pioneer—and yet this bird, Boyd, has been in the telephone business since 1897, a trifle of 24 years.

Newark, O., Company Elects W. L. Cary President.

Newark, O.—W. L. Cary of Columbus, and formerly of Mt. Vernon, O., has been elected president of the Newark, O., Telephone company. Mr. Cary is an experienced telephone man and is well known in the industry.

"Saved Our Cable"

Drops Meant Dollars When This Conduit Was Pumped.

Lansing, Mich. — Quick thinking and an Al pump saved the Citizens' Telephone company from a serious setback in an important cable job, according to the letter of R. I. Briggs, district manager of the Citizens' company, which is featured in a recent issue of the Novo Engine company's house organ.

The Novo Type N Pumping Outfit is shown loaded on one of the telephone company's trucks, engaged in pumping water from a conduit manhole. The story of the resourceful performance, as written by Mr. Briggs, follows:

"On one job alone we saved many times the cost of the pump. We were putting in service a 200 pair cable designed to take care of the growth in the business district and before the work of splicing these cables was completed, an unusually heavy rain came up and the manholes started to fill with water, interfering with the men working on these cables. A hurry-up call was sent for the Novo Diaphragm Pump. Its ease of handling enabled it to be loaded on the truck, as shown in the photograph, and it was on the scene in a few minutes.

"The pump continued running through the storm, draining the manhole as fast as the rain poured in and kept the water from reaching the unfinished work. Had the water reached the cables at that stage of the progress of the work, it would have meant pulling the cable for one section and replacing it with a new one. This would have resulted not only in delay, but would have involved a very heavy expense.

"The Novo Diaphragm Pump displaced a manually operated pump requiring three men. With the Novo much time is saved as well as labor.

"Up until the time we had this pump, water frequently raised above the conduit openings in the manholes, causing all sorts of trouble. We have no trouble at all now keeping the manholes and conduits drained regardless of the weather conditions. The Novo can be started and requires no attention until the manhole is pumped out."

The Anderson Trouble Finder Test Set.

This is a practical device, invented by a successful telephone man and built under his supervision by the West Mfg. Co., Abilene, Kans. It detects trouble without opening the line and works on any kind of a circuit-bare or insulated; copper or iron. This Test Set is two devices in one, a compact light weight portable telephone and a reliable trouble finder. It takes the trouble man directly to the point of trouble, whether it be a "short," "cross," "ground" or "open." No cutting of the circuit is necessary when this set is used, and it will also eliminate useless walking and following of lines. Where circuits follow the "right-of way" or where they leave the roads, a wonderful saving of time can be effected as a test can be made every mile or at such points where the line can be reached conveniently, and the trouble can be located in a certain section. The proximity of trouble can be judged by the loudness of the tone in the receiver. The closer the trouble the louder the tone. The trouble man can tell immediately if he has gone by the trouble. Anderson's Trouble Finder Test Set soon pays for itself as circuits of importance not only involve maintainance expense or cost of clearing trouble but the income from toll revenue, which is a vital issue, says the maker.

QUESTIONS AND ANSWERS

Conducted by W. N. Furthman

This department is being devoted each month to our subscribers who may require expert advice on special topics, now and then. All of the questions submitted will be answered each month as they are received. If the questions require an answer of some length it will be necessary to furnish the subscriber with a special statement. In requesting statements of this kind self-addressed envelopes should be enclosed with the request. Special attention will be given in the column to engineering questions, particularly testing of all kinds, purchasing requirements, specifications, appraisals and rates.

Overcoming Crosstalk.

Q. What is the most economical method of overcoming crosstalk in a telephone line system?

Ans. Transposing the line circuits is one method; using twisted conductors is another and in our opinion the most economical consists in the balancing of the wires of a pair at the intermediate distributing frame.

Contact Point Wear.

Q. What electrical causes increase the ordinary mechanical wear of contact points in apparatus in a telephone exchange?

Ans. In all telephone exchanges one side of the talking and ringing circuit is grounded. This permanent grounding of one side of the line causes projection from one of the contacts and a greater effect in the other. This uneven wearing of the contacts causes them to deteriorate very rapidly, eventually causing poor contact. In an automatic exchange this condition is very serious due to the large number of contact points in the system and from a theoretical standpoint has always been one of the reasons why the maintenance of an automatic system can be considered somewhat more expensive than that of a manual switchboard. It will be clear that if the manual or automatic switchboard were so designed and constructed that the polarity of the talking and ringing contacts could be interchanged periodically this uneven wearing of the contacts would be overcome.

Interconnection Factors.

Q. What do you consider the most important factor to be considered in interconnection of two different telephone systems?

Ans. From a talking standpoint most of the modern telephone exchanges can be interconnected without any considerable loss in telephone transmission, therefore the most important consideration in interconnecting two telephone systems must be given to the signalling circuits. The marginal operation of the relays in the supervising circuits are often installed upon very narrow limits and unless these operating limits of the interconnecting systems are on the same basis a very considerable amount of false signalling will result.

Loading Coil Protection.

Q. When installing loading coils, is it necessary to protect both the aerial type in overhead circuits with lightning arresters as well as those cable loading coils which are located in conduit or vaults underground?

Ans. It is not necessary to install a lightning arrester for protecting loading coils which are used for cable loading and are installed either in conduit or vaults underground. Cable loading coils are therefore smaller in mechanical dimensions than the aerial type of loading coil. The aerial coils are protected with air gap arresters. These arresters are located upon the same poles as the loading coils. The aerial type of loading coil is insulated with eight layers of varnished linen between windings and will stand a test of 12,000 volts.

Compares Insulators.

Q. Why are porcelain petticoated insulators better than the ordinary pony glass insulator?

Ans. Porcelain offers a higher surface insulation than glass. It has been found in practice on long distance lines that where insulated wires are led from the bottom of an insulator by means of capilliary attraction, water, so to speak, will run uphill and where the two insulated wires lead to the two wires of a circuit that are bare poor insulation is the result. In the design of a petticoated porcelain insulator, it is so constructed that water or moisture which approaches the insulator by capilliary attraction is forced, by the design of its petticoats to run uphill as well as downhill, and it is this downward flow of the water or moisture that it forms in drops and leaves the insulator by gravity.

Shreeve vs. DeForest Repeaters.

Q. Please send us your opinion as to why the Shreeve repeater was not as successful as the so-called DeForest type of repeater.

Ans. One of the greatest difficulties which Mr. Shreeve had to overcome in the design of his repeater was to eliminate the inertia of the movable mechanical parts of his relay. In the DeForest repeater this difficulty was not encountered as the movable parts, small as they were, were enclosed in a vacuum type bulb and were operated entirely by magnetism. In this connection it may be stated that the movable parts of the DeForest repeater are so sensitive that it was impossible to construct such a repeater until the art of inserting filaments in a vacuum in a glass bulb had reached the highest point of perfection.

Comparing Equipment.

Q. What is the best method for comparing transmitters and induction coils as made by the different manufacturers?

Ans. It has been the practice for a good many years to test transmitters and induction coils in the laboratory by means of talking tests using the human voice over artificial miles of cable. A test of this kind depends upon the hearing of the tester at the receiving end, and it has been the writer's experience that where two types are to be closely compared, variation in the tone of the voice in talking added to the error in receiving by two different parties, over a long series of tests, is not an accurate method. The only satisfactory method which the writer has found consists in the use of a galvinometer and a Barretter. Provided you would be interested in the use of such an instrument, I would be pleased to send you a complete description of it giving full information as to its use.

Switchboard Cord Efficiency.

Q. Why are copper cords more efficient than steel switchboard cords?

Ans. Several attempts have been made to manufacture a steel switchboard cord which would be as flexible as a copper tinsel cord and which would have the same wearing life and also the same resistance as a copper cord. As far as I am aware all of these efforts have only resulted in partial success. In one case the flexibility might be obtained but at a loss of wearing life or vice versa. In one instance both of these desirable results were obtained but it was found that when the steel type of switchboard cord became heated in service its resistance became greater than comparable copper tinsel cord. While this difference in resistance was a small amount there are margins in some circuits where the difference in resistance would prevent the operation of those circuits in as efficient a manner as they were operated when copper cords were used.

Crosstalk Limit.

Q. Why are retardation repeating coils tested for crosstalk and what is the maximum limit?

Ans. Retardation repeating coils are generally used in composite telephone telegraph circuits. All coils which are used in the talking side of a circuit must be free from unbalances and on this account they are tested for crosstalk. The writer has balanced coils of this kind so that they did not contain any units of crosstalk. Since this can be done by an ordinary inspection operation it would appear that these coils can be manufactured without any crosstalk.

Artificial Line Use.

Q. Do they use so-called artificial lines in repeater circuits and why?

Ans. Artificial lines are used in repeater circuits for the purpose of balancing the incoming current with the outgoing current. Unless this is done crosstalk will develop in the repeater circuit. You will find an article in the November issue of TELEPHONE ENGINEER fully describing the use of these artificial lines and their construction.

Mercury Arc Rectifiers.

Q. What are the principal objections to the use of mercury arc rectifiers?

Ans. One of the principal objections to the use of mercury arc rectifiers as compared to the mechanical type consists in the fact that it is the practice of commercial lighting companies to consolidate the panel loads during the night. This monetary throwing of the switches while very rapidly made, is of sufficient length of time to cause the mercury to drop down to the bottom of the tube. So-called shaker relays have been designed for the purpose of again starting the mercury arc rectifier but as far as the writer is aware they have not been found successful. Another objection is the high cost of replacing the mercury arc lamps as compared to the upkeep cost of a good mechanical rectifier. Mercury arc lamps have a comparatively short life and their replacement cost is therefore considerably higher than the cost of the replaceable parts of a mechanical rectifier.

Loading Coil Necessity.

Q. Are loading coils necessary for long distance transmission?

Ans. Loading coils are necessary to give good transmission over a distance exceeding 1,000 miles of aerial circuit. The writer has talked on No. 8 gauge circuits located between New York and Chicago and has obtained good transmission on unloaded aerial circuit.

Overcoming Singing.

Q. We have been using a hand set containing a transmitter and receiver in our office, and we note that in starting to talk it has a tendency to sing. Please advise us of a suitable method for overcoming this condition.

Ans. Provided the handle of the hand set is constructed so that there is no mechanical vibration in its use the cause of the singing of the hand set may be due to several reasons. One of the principal reasons for this condition has been found to be in the unbalance of the coils for resistance, inductance and capacity that are used in the receiver. By balancing out these fundamentals in the receiver coils in most cases this singing of the hand set can be entirely eliminated without any sacrifice to good transmission.

Loading Coil Location.

Q. How is the location of loading coils determined in the cable and aerial types of circuits?

Ans. Provided the insulation resistance of the aerial and cable circuits is very good this factor is entirely eliminated in the calculation of the proper loading of a circuit. It is then only necessary to measure the capacity, inductance and resistance by means of Professor Pupin's formula and the location of coils in that circuit is a comparatively simple matter. Professor Pupin's formula has appeared in a number of articles in TELEPHONE ENGINEER in connection with a study on loading coils, but in case you have not these copies of the magazine, we will be pleased to send you the formula. For example a No. 8 gage aerial circuit may be loaded with a coil having an inductance of .26 henry every 12 miles. In accordance with Professor Pupin's formula, it has been the practice to install these coils every 8 miles. While a higher degree of transmission may be obtained by locating a coil every 8 miles on a No. 8 gauge copper circuit, the degree of transmission when loading the circuit every 12 miles is commercially satisfactory.

The same general principles applied to underground cable circuits it being understood that the capacity of the underground cable circuit is higher than the capacity of the aerial type of circuit. For example cable circuits are loaded at a distance of 1.4 miles. While this distance is materially higher than that specified by Professor Pupin's formula, good commercial transmission can be obtained by locating cable coils every 2½ miles.

Power Wires as Circuits.

Q. Can power wires be used for telephone circuits?

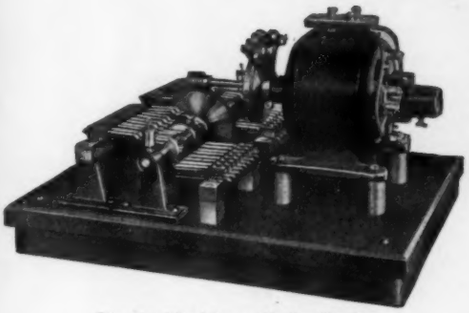
Ans. Power wires of very high voltages are being used throughout the country successfully for telephone circuits. The frequency of power circuits does not lie within the range of telephone transmission and can be therefore used without interference in this respect. One of the difficult problems involved in using power wires for telephone circuits lies in the protection of the ordinary user of these circuits. This protection can be amply obtained by means of air gap lightning arresters and transformers of high insulation and the use of proper and good fuses. We will be pleased to send you a description in detail of a circuit of this kind provided you desire further information.

Storage Battery Tests.

Q. What is the most important test that can be applied in making a comparative analysis of more than one type of storage battery?

Ans. In the writer's opinion the most satisfactory method of comparing storage batteries is by means of what is termed the idle charge test.

A Telephone Exchange Must Always Be Operative



Ringing Machine with Auxiliaries

Holtzer-Cabot Ringing Machines, with their varied auxiliaries, in the way of labor-saving devices, are the acme of ingenuity—

The Automatic Ringing Attachment saves manual ringing;

The Recall Flasher gets the operator on a recall, by one movement of the switch hook;

The Automatic Don't Answer indicates that the subscriber is not in;

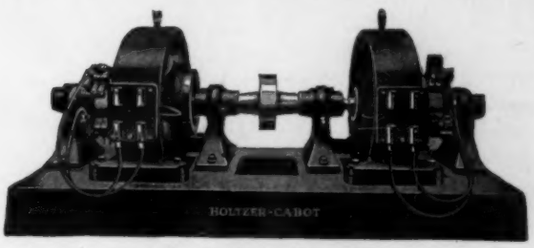
The Antomatic Busy Back says the line is in use;

The Howler tells the subscriber the receiver is off the hook.

A breakdown, for a single minute, of any vital machinery, would suspend telephone communication in the entire town.

This spells the reason why that 90% of the Independent telephone exchanges in the United States have **Holtzer-Cabot Power Plant Equipment.**

Holtzer-Cabot Noiseless Charging Motor-Generators are the most carefully made electric machinery in the world.



Charging Motor-Generator

All of these Devices are Labor-Saving and Produce Efficiencies in Exchanges

In a word, Holtzer-Cabot apparatus gives 24 hours of continuous, satisfying service, not only to the exchange, but to the subscribers.

Send for Bulletin 302D for a description of our Telephone Power Plant Equipment.

The Holtzer-Cabot Electric Company, 6161-65 So. State Street, Chicago, Ill.

This test consists simply in charging the batteries and permitting them to stand over a specified period of time and then determining what battery has held the maximum percentage of its charge. In making a test of this kind it is suggested that the two or more batteries to be compared should be obtained from the manufacturer in a dry state. They are then to be filled by the same operator who also performs the various assembling operations. In charging the batteries they should all be charged from the same circuit in which a permanent ammeter is installed. Before permitting the batteries to remain idle six ratings for gravity should be taken of each cell. Provided these precautions are taken it can be assured that the batteries have all had similar care and attention and are therefore equal in this respect at the beginning of the test.

City Grounded Circuits.

Q. Can grounded telephone circuits be used in large cities?

Ans. All so-called metallic circuits are grounded for talking at the storage battery at each office through which the circuit passes, therefore, it may be said that all telephone lines now used universally in the United States are grounded circuits. Most of the telephone circuits in the centers of large cities are installed in underground cable and even though only one wire were to be used it could be successfully operated in large cities. It is a well known fact that all four party line pole circuits are grounded for selective ringing. The practical operation of this system was a difficult one and in its perfection overcame more problems than would be found in making a one wire grounded system operative in a large city.

Harmonic Ringers.

Q. Do you recommend harmonic ringers as reliable and efficient?

Ans. Like a good many other complicated pieces of apparatus in the telephone field, there has been considerable experimental work in the development of harmonic systems. Some of these systems were put on the market before they were fully developed and naturally some of them were sold that were not satisfactory. Some of these systems were called the "in tune" systems. The reeds of these ringers were all given a rate of vibration when not striking the gongs and this vibration was below that of the current frequency. This current frequency, however, was not so far out of tune that the current frequency would not operate it. Under this condition when the rod began to strike the gongs it would accelerate and thus come into tune with the current frequency. In what was known as the successful "in tune" system tuning was accomplished at the rate of vibration of the reed so that it would correspond with the vibration at which the bells were ringing. In this manner all of the bells could be tuned at their proper starting frequency. In this manner it will be observed that all cross ringing difficulties were immediately overcome. In the satisfactory design of an "in tune" system the electromagnetic effect on the armature is so great as to prevent any tendency of the gongs to throw the armature out of synchronism.

Exchange Lighting.

Q. Is there a standard method of satisfactory lighting for a modern telephone exchange?

Ans. Provided you will consult your local lighting expert you will

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Indicating Rail Bond Testers—Ohmmeters, Test Sets, Galvanometers, Etc.

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Underwood Bldg., San Francisco, Cal.

no doubt find that there is a so-called standard method of lighting telephone exchanges. The problem of lighting the switchboard, however, is a more difficult one than this as it affects the efficient operation not only of the supervising officials but also the operators at the board. Studies in lighting have shown that a good many so-called standard methods of lighting produce headache and lassitude, especially at the peak hour of the heavy traffic. In considering the lighting of your switchboard, I would recommend that instead of consulting the manufacturer of a particular type of system that you send a diagrammatical chart of your exchange and the lineup of the board and its equipment on all floors and I will then be in a position to discuss fully with you what may be considered the most satisfactory type of lighting system to meet your particular local conditions.

Companies May Sacrifice Profits to Hold Subscribers.

Telephone companies, voluntarily, can do what utility commissions can not legally require them to do as regards waiving a fair return on this property. The Nebraska commission has given the Farmers' Union Telephone Co. of Winnetoon, permission to reduce its rate from $1.50 a month to $1.25, the pre-war figure. The company told the commission it was forced to choose between loss of subscribers or doing business at a loss. When the prices of farm products increase, farmers will not object to a rate increase to a profitable point, President Henry Schwartz said.

Strikes against existing rates, have occurred at various points in Nebraska, but the companies, with the exception of the Union company of Wausa, which has a strike at Bloomfield, are not seriously affected. The Union Telephone Co. also is making headway in regaining subscribers.

1922 EDITORIAL FEATURES
of
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Having appraised more than 300 telephone systems enables me to guarantee you an appraisal that will meet with all the requirements.

Will Save You Money
THE MODERN LINEMAN'S
Anderson's Trouble Finder TEST SET

The FINDER COIL locates trouble on copper or iron wire, whether bare or insulated, and works on metallic and grounded circuits alike. No cutting of wi r es required.

It is especially profitable for lines in the mountains, swamps, forests, right of ways and where the lines are hard to follow. It pays its way by saving time and circuit revenue.

Convince yourself at our expense. Order one today, turn it over to your trouble man on 15 days trial. The results will be surprising. If not satisfied return at our expense.

West Manufacturing Co.
ABILENE, KANSAS

The first inspection in the forest where the poles are cut.

The second inspection at the receiving yards.

In the pole yard at Hawthorne, Ill., typical of the 35 yards where poles are finally inspected before shipment to users.

"organized to help operators of outside plants keep the lines working."

Now when you are putting your house in order to meet Winter's emergencies our nearby Distributing House can help by making quick deliveries of everything for your outside plant.

Its organization is composed of emergency specialists who can help you cut "out of service" hours to a minimum.

A prominent part of its service is contributed by its exceptional facilities for providing sound, durable poles of Western Red Cedar, Northern White Cedar, Chestnut and Creosoted Yellow Pine. These poles are all carefully inspected three times before delivery to assure sound timber.

Call on the nearest House for this assistance. It's located in a trade and transportation center near you. There are 48 such Houses and all are organized to help operators of outside plants keep the lines working.

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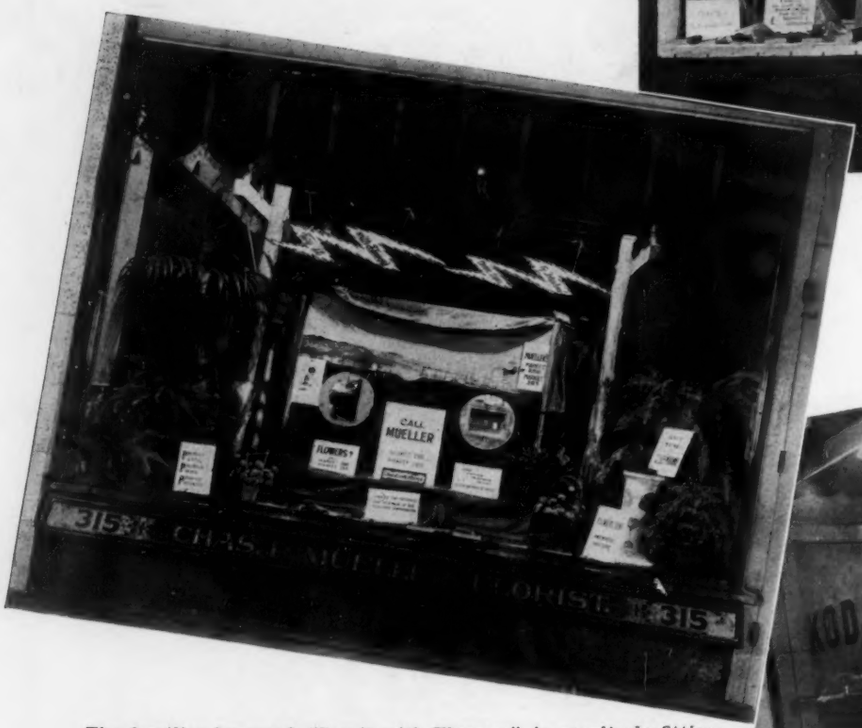
Western Electric Company

OFFICES IN ALL PRINCIPAL CITIES

WINNING THE WINDOW SHOPPING PUBLIC AT WICHITA.

How Southwestern Bell Telephone Co.'s Customers Make Use of Its Service in Building Their Business.

One of the leading department stores in Wichita co-operates with the commercial department in featuring the slogan, "Shop by Phone". The lady at the P. B. X. board is made of wax, but she gets across the idea, all right.



The familiar by-word, "Say it with Flowers", is peculiarly fitting when linked up with the telephone. Here's the way the commercial department dressed up Mr. Mueller's window to get Wichita folks to "say it over the telephone". The display in the background can be seen better in the window on the right.

And here is the window of Dockum's Drug Store, where prompt service on telephone orders is emphasized. The display board in the center traces the path of a message over the circuit, from calling party to called party, by means of tiny electric lights.

At the left is Hockaday's, distributor of tires and accessories, famous throughout Kansas for its "H H" highway signs. Hockaday's features free road service —and that's where the telephone comes in.

—*Southwestern Telephone News.*

American Steel & Wire Co.'s W & M

Telephone Telegraph Wire

Strand Steel Wire
Pole Steps

Descriptive literature—free

American Steel & Wire Company
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For further information write for Bulletin 500

Standard Underground Cable Company

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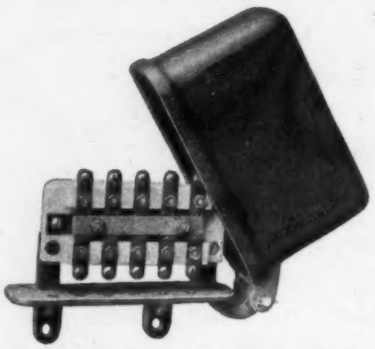

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Ask your Lineman, "**the man who knows,**" the kind of wire best adapted for perpetual, satisfactory service. He will say

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Before purchasing your next supply get our samples; test and compare, we may save you a costly mistake. Muncie Wire is handled by most representative Jobbers and Supply Houses.

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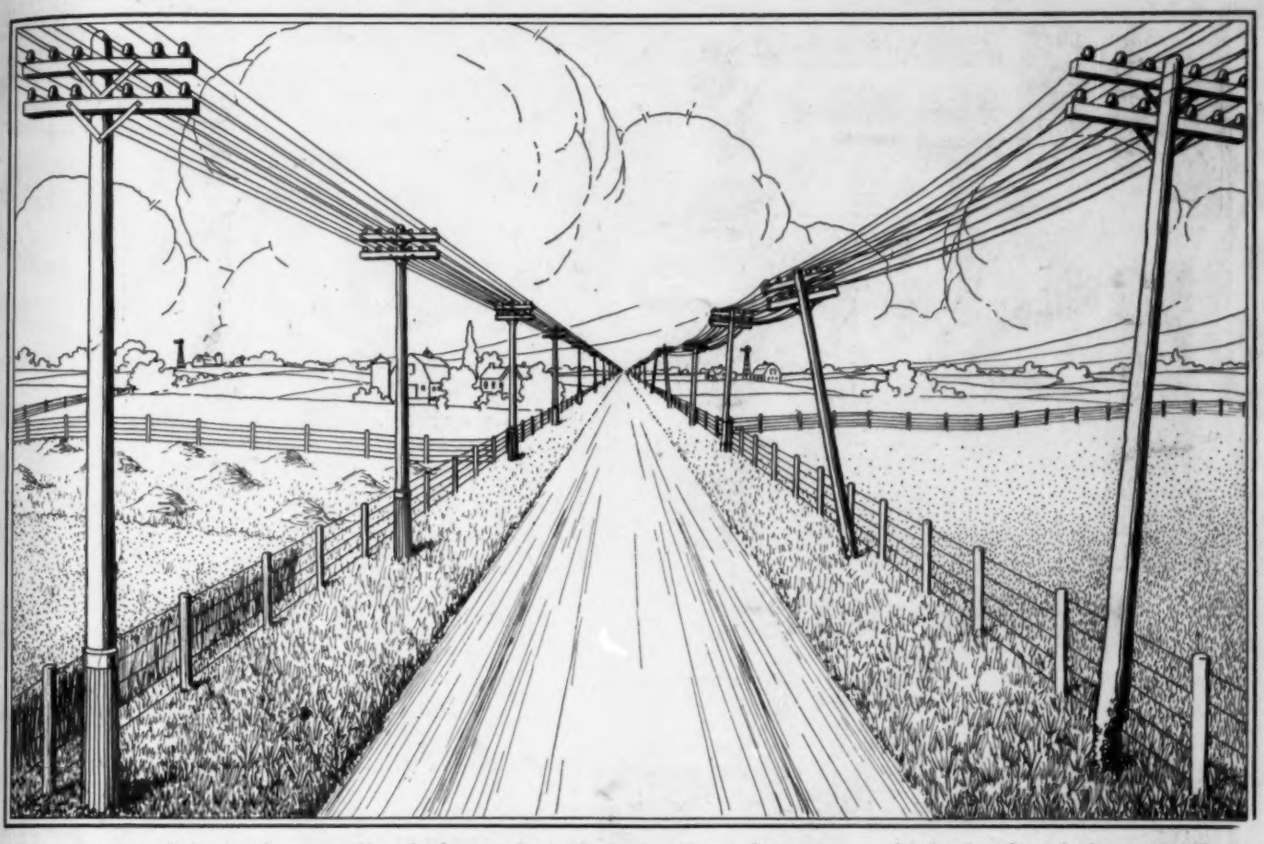
Attention Line Owners:

Here is a practical device for reinforcing the bottoms of old poles. The Linemen's Friend and the Patron's guarantee of continuous service.



Above on the right is shown a line before rebuilding, on the left as it would look after being rebuilt by our patent pole appliance.

This appliance is built of gauge and sizes to meet all requirements; it can be adjusted to meet various sizes by means of the interlocking and emergency keys.

It is cheap to buy; easy to install; gives a line a neat and attractive appearance. It is the New Way to rebuild old lines—The Iron Bottom Way—The Fire-proof Way—The attractive and economical way. It saves poles, labor, time and money and gives more efficient service. It insures, increases and maintains the maximum breaking resistance of poles at all times. It gives elasticity to old poles and affords them strength to withstand ice and wind-storms and is an assurance of safety for linemen to climb. It gives old lines their normal heighth and proper vibration. It does away with over head work while rebuilding and in no way interferes with service.

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No. 6